

**MAHATMA GANDHI UNIVERSITY
KOTTAYAM**



**B.VOC Degree Program –
FOOD TECHNOLOGY & ANALYSIS
Regulation Scheme & Syllabus
(2018 admission onwards)**

B.VOC. FOOD TECHNOLOGY AND ANALYSIS

SYLLABUS

PROGRAMME STRUCTURE

Sem	Code	Subject	General /Skill	Hours per week	Credit	Marks	Evaluation
One	BOCG101	Listening And Speaking Skills In English	General	4	4	ESA-80 ISA-20	Theory
	BOCG102	IT For Business (AOC)	General	3	4	ESA-80 ISA-20	(AOC)
	BOVG101	Basic Theoretical And Analytical Chemistry	General	3	4	ESA-80 ISA-20	Theory
	BOVS101	General Mathematics And Statistics	Skill	5	6	ESA-80 ISA-20	Theory
	BOVS102	Food Chemistry	Skill	5	6	ESA-80 ISA-20	Theory
	BOVS103	Food Chemistry Practical	Skill	5	6	ESA-80 ISA-20	Practical
Two	BOCG201	Writing and Presentation Skills in English	General	4	4	ESA-80 ISA-20	Theory
	BOVG201	Basic Organic Chemistry	General	4	4	ESA-80 ISA-20	Theory
	BOVG202	Nutritional Biochemistry	General	5	4	ESA-80 ISA-20	Theory
	BOVS201	Food Preservation	Skill	6	6	ESA-80 ISA-20	Theory
	BOVS202	Dairy Technology	Skill	6	6	ESA-80 ISA-20	Theory
	BOVS203	INTERNSHIP I - Dairy Industry	Skill		6	ESA-80 (Pr-50, V-30,ISA-20)	Project
Three	BOCG301	Principles Of Management	General	4	4	ESA-80 ISA-20	Theory
	BOVG301	Bio Organic Chemistry	General	3	4	ESA-80 ISA-20	Theory
	BOVG302	Food Packaging Technology	General	3	4	ESA-80 ISA-20	Theory
	BOVS301	Post Harvest Technology I	Skill	5	6	ESA-80 ISA-20	Theory
	BOVS302	Food Additives And Food Safety Standards	Skill	5	6	ESA-80 ISA-20	Theory

	BOVS303	Food Additives Practical	Skill	5	6	ESA-80 ISA-20	Practical
Four	BOCG401	Soft Skills & Personality Development	General	4	4	ESA-80 ISA-20	Theory
	BOVG401	Advanced Physical Chemistry	General	4	4	ESA-80 ISA-20	Theory
	BOVG402	Post Harvest Technology II	General	5	4	ESA-80 ISA-20	Theory
	BOVS401	Food Microbiology	Skill	6	6	ESA80 ISA-20	Theory
	BOVS402	Food Microbiology Practical	Skill	6	6	ESA-80 ISA-20	Practical
	BOVS403	Internship II	Skill		6	ESA-80 (Pr-50, V-30,ISA-20)	Project
	Five	BOCG501	Environmental Studies	General	4	4	ESA-80 ISA-20
BOVG501		Analytical Instrumentation	General	3	4	ESA-80 ISA-20	Theory
BOVG502		Sensory Analysis Of Food	General	3	4	ESA-80 ISA-20	Theory
BOVS501		Food Toxicology	Skill	5	6	ESA-80 ISA-20	Theory
BOVS502		Food Analysis 1	Skill	5	6	ESA-80 ISA-20	Theory
BOVS503		Food Analysis I Practical	Skill	5	6	ESA80 ISA-20	Practical
Six	BOCG601	Entrepreneurship Development	General	4	4	ESA-80 ISA-20	Theory
	BOVG601	Food Engineering	General	4	4	ESA-80 ISA-20	Theory
	BOVG602	Food Safety Management Systems	General	5	4	ESA-80 ISA-20	Theory
	BOVS601	Food Analysis II	Skill	6	6	ESA-80 ISA-20	Theory
	BOVS602	Food Analysis II Practical	Skill	6	6	ESA-80 ISA-20	Practical
	BOVS603	Internship III (PROJECT)	Skill		6	ESA-80 (Pr-50, V-30,ISA-20)	Project

ESA – End semester assessment
ISA – Internal semester assessment
AOC-Activity oriented course
General – General course for all B.Voc course
Skill- Skill dominie Courses
Pr – Project
V – Viva

Semester I

General paper 1

Paper Code – BOCG101

LISTENING AND SPEAKING SKILLS IN ENGLISH

MODULE – I

Speech Sounds: Phonemic symbols – Vowels – Consonants – Syllables – Word stress – Stress in polysyllabic words – Stress in words used as different parts of speech – Sentence stress – Weak forms and strong forms – Intonation

Sample activities:

- 1- Practice reading aloud. Use a variety of texts including short stories, advertisement matter, brochures, etc*
- 2- Read out a passage and ask the students to identify the stressed and unstressed syllables.*

MODULE – II

Basic Grammar: Articles - Nouns and prepositions - Subject-verb agreement -

Phrasal verbs - Modals - Tenses - Conditionals – Prefixes and suffixes – Prepositions -Adverbs – Relative pronouns - Passives - Conjunctions - Embedded questions - Punctuation – Abbreviations-concord- collocations-phrasal verbs- idiomatic phrases

Sample activities:

- 1- Ask students to write a story/report/brochure, paying attention to the grammar.*

MODULE – III

Listening: Active listening – Barriers to listening – Listening and note taking – Listening to announcements – Listening to news on the radio and television.

Sample activities:

- 1- *Information gap activities (e.g. listen to a song and fill in the blanks in the lyrics given on a sheet)*
- 2- *Listen to BBC news/ a play (without visuals) and ask the students to report what they heard.*

MODULE– IV

Speaking- Fluency and pace of delivery – Art of small talk – Participating in conversations – Making a short formal speech – Describing people, place, events and things – Group discussion skills, interview skills and telephone skills.

Sample activities:

- 1- *Conduct group discussion on issues on contemporary relevance.*
- 2- *Ask students to go around the campus and talk to people in the canteen, labs, other departments etc. and make new acquaintances.*
- 3- *Conduct mock interviews in class.*
- 4- *Record real telephone conversations between students and ask them to listen to the recordings and make the corrections, if any are required.*

MODULE – V

Reading: Theory and Practice – Scanning – Surveying a textbook using an index – reading with a purpose – Making predictions – Understanding text structure – Locating main points – Making inferences – Reading graphics – Reading critically – Reading for research.

Books for Reference:

- 1- V.Sasikumar, P KiranmaiDutt and GeethaRajeevan, .*Communication Skills in English*.Cambridge University Press and Mahatma Gandhi University.
- 2- Marilyn Anderson, Pramod K Nayar and Madhucchandra Sen. *Critical Thinking, Academic Writing and Presentation Skills*. Pearson Education and Mahatma Gandhi University.

For Further Activities

1. *A Course in Listening and Speaking I & II*, Sasikumar, V.,KiranmaiDutt and Geetha Rajeevan, New Delhi: CUP, 2007
2. *Study Listening: A Course in Listening to Lectures and Note-taking* Tony Lynch New Delhi: CUP,2007.
3. *Study Speaking: A Course in Spoken English for Academic Purposes*. Anderson, Kenneth, Joan New Delhi: OUP, 2008

Total Marks -100**Internal - 20****External – 80****BOCG102 - IT FOR BUSINESS****Module – I****10 Hrs**

Introduction to Information Technology: Information and Communication Technology (ICT), Information systems E-World - Computer Architecture: Input Hardware - Processing & Memory Hardware, Storage Hardware, Output Hardware, Communication Hardware - Concept of operating system - Understanding your computer customization configuring screen, mouse, printer.

Module – II**15Hrs**

Word Processing Package: Introduction - Features - Word User Interface Elements; Creating new Documents; Basic Editing, Saving a Document; Printing a Document; Print Preview, Page Orientation - Viewing Documents; Setting tabs - Page Margins; Indents; Ruler, Formatting Techniques; Font Formatting, Paragraph Formatting; Page Setup; Headers & Footers; Bullets and Numbered List; Borders and Shading; Find and Replace; Page Break & Page Numbers; Mail Merging-Spelling and Grammar Checking; Tables; Formatting Tables;

Module – III**15Hrs**

Spreadsheet Package: Introduction, Excel User Interface, Working with cell and cell addresses, Selecting a Range, Moving, Cutting, Copying with Paste, Inserting and Deleting cells, Freezing cells, Adding, Deleting and Copying Worksheet within a workbook, Renaming a Worksheet. Cell Formatting Options, Formatting fonts, Aligning, Wrapping and Rotating text, Using Borders, Boxes and Colors, Centering a heading, Changing row/column height/width, Formatting a Worksheet Automatically, Insert Comments, Clear contents in a cell. Using print Preview, Margin and Orientation, Centering a Worksheet, Using header and footer.

Module – IV**10Hrs**

Advanced Features of Spreadsheet Package: All Functions in Excel, Using Logical Functions, Statistical functions, Mathematical etc. Elements of Excel Charts, Categories, Create a Chart, Choosing chart type, Edit chart axis - Titles, Labels, Data series and legend, Adding a text box, Rotate text in a chart, Saving a chart.

Module – V**10 Hrs**

Presentation Package: Ms-PowerPoint: Advantages of Presentation Screen layout creating presentation inserting slides adding sounds & videos-formatting slides -slide layout views in presentation -slide transition Custom animation Managing slide shows - using pen Setting slide intervals.

Total Marks -100**Internal - 20****External – 80**

Books for Reference:

1. Antony Thomas. Information Technology for Office. Pratibha Publications
Gini Courter & Annette Marquis. Ms-Office 2007: BPB Publication

BOVG101 -BASIC THEORETICAL AND ANALYTICAL CHEMISTRY

Module 1: Atomic structure and chemical bonding

10Hrs

Atomic structure –atom's model introduction, Bohr atom model and introductions, Dual nature of matter and radiation. Photoelectric effect, de-Broglie equation, Heisenberg's uncertainty principle, Concepts of orbital, Quantum numbers, shapes of orbitals(s-, p-, d-), Electronic configurations of atoms- Aufbau principle, Hund's rule of maximum multiplicity, Pauli's exclusion principle.

Chemical Bonding- Introduction- Types of bonds. Ionic bond: factors favouring the formation of ionic bonds- Lattice energy of ionic compounds and its applications. Covalent bond: Lewis theory – Valence bond theory- Coordinate bond. VSEPR theory and examples. Hybridisation: sp^3 , sp^2 , sp (ethane, ethane, ethyne). Intermolecular forces- hydrogen bonding in H_2O - dipole-dipole interactions.

Module 2- Fundamental concepts in chemistry

15 Hrs

Periodic properties: Modern periodic law- long form of periodic table. Periodicity in properties: Atomic radii, ionic radii, ionization enthalpy, electron affinity(electron gain enthalpy) and electronegativity (Pauling scale). Atomic mass_ molecular mass- mole concept-molar volume- Oxidation and reduction- oxidation number and valency- Equivalent mass. Methods of expressing concentration: weight percentage, molality, molarity, normality, mole fraction, ppm and millimoles.

Concepts of Equilibrium: Acids and bases: Arrhenius, Lowry-Bronsted and Lewis theories. Ionic product of water- pH and pOH, Strengths of acids and bases- K_a and K_b , pK_a and pK_b . Buffer solution. Preparation of buffer solution having a known pH. Solvation, solubility, solubility product, common ion effect and their applications.

Module 3- Laws of Thermodynamics

15 Hrs

System and surrounding, First law of Thermodynamics. Internal energy, Significance of internal energy change, enthalpy, Second law of Thermodynamics, Free energy, Entropy and Spontaneity, Statement of second law based on entropy, Entropy change in Phase transitions (No derivation required)- Entropy of fusion, Entropy of vapourization, Entropy of sublimation.

The concept of Gibbs's free energy- Physical significance of free energy, conditions for equilibrium and spontaneity based on ΔG values. Effect of temperature on spontaneity of reaction. Third law of Thermodynamics.

Module 4- Basic Concepts of Analytical Chemistry

10 Hrs

Laboratory Operations (Non- evaluative): laboratory safety and first aid. Use of different glassware like pipette, burette, standard measuring flask, distillation apparatus; heating methods, filtration techniques, weighing principle in chemical balance, weighing in electronic balance.

Methods of Analysis: Volumetric method of Analysis; General principles. Primary and secondary standards, criteria for primary standards, preparation of standard solutions, standardization of solutions, end point. Acid base, redox and complexometric titrations and corresponding indicators. Double burette method of titration; principle and advantages. Microanalysis and its advantages. Gravimetric method of analysis; General principles.

Reporting of analytical data: Units, significant digits, rounding, scientific and prefix notation, graphing of data-Precision and accuracy- Types of errors- Ways of expressing precision- Methods to reduce systematic errors.

Separation and purification Techniques: Recrystallisation, use of drying agents, sublimation. General principles of distillation, fractional distillation, distillation under reduced pressure. Solvent extraction.

Module 5- Chromatographic Techniques

10 Hrs

Chromatography- Principle of differential migration. Classification of chromatographic methods. Basic principle and uses of Thin Layer chromatography (TLC), Paper chromatography (PC), R_f

value, Column Chromatography, Gas chromatography (GC), High performance Liquid Chromatography (HPLC), Ion Exchange chromatography (IEC).

Total Marks -100

Internal - 20

External – 80

References

1. B.R. Puri, L.R. Sharma, M.S. Pathania, *Elements of Physical Chemistry*, 3rd edn. Vishal Pub. Co., 2008.
2. C.N.R. Rao, *University General Chemistry*, Macmillan, 2009.
3. Manas Chanda, *Atomic Structure and Molecular Spectroscopy*.
4. P.L.Soni, *Inorganic Chemistry*.
5. R.A. Day Junior, A.L. Underwood, *Quantitative Analysis*, 5th edn. Prentice Hall of India Pvt. Ltd. New Delhi, 1988.
6. J. Mendham, R.C.Denney, J.D.Barnes, M.Thomas, *Vogel's Text book of Quantitative Chemical Analysis*, 6th edn. Pearson Education(2003).
7. R.Gopalan, *Analytical Chemistry*, S. Chand and Co., New Delhi.

BOVS101 - GENERAL MATHEMATICS AND STATISTICS

Maximum Hours:90

MODULE I

20 hrs

Linear Algebra: Matrix definition, Order of a Matrix ,Types of Matrices, Addition of Matrices, Multiplication of Matrices, Various kinds of Matrices, Transpose of a Matrix, Linear system of equations and solutions using Gauss Elimination.

MODULE II

20Hrs

Differentiation: Derivative at a point, Derivative of a Function, Differentiation of important functions, Product rule, Quotient rule, Differentiation of a function of a function (problem based),Higher order derivatives.

MODULE III

25 Hrs

Integration: Integral as Anti-Derivative, Fundamental Theorems (without proof), Standard Results, Methods of Integration – integration of the product or the quotient of two functions, Integration by substitution, Integration through partial fractions, Integration by parts, Definite Integral: Evaluation by substitution, Properties of Definite integrals (problem based).

MODULE IV

25Hrs

Discriptive Statistics: Data Representation, Diagrams and graphs using MS Excel, Measures of Central Tendency (Mean,Median,Mode),Measures of Dispersion(Range, Quartile deviation, Mean deviation, Standard deviation),Variance,Skewness and Kurtosis (definition only), Probability: Basic concepts, Three definitions (Frequency or statistical definition, Classical definition, Axiomatic definition),Simple problems.

Total Marks -100

Internal - 20

External – 80

TEXTS:

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley
2. Thomas Calculus 13th Edition, George B.Thomas,Pearson
3. Basic Statistics,Seemon Thomas,2014 Edition,Narosa Publishing House

REFERENCES:

1. Higher Engineering, John Bird, Elsevier Direct
2. Skills in Mathematics: Algebra, S.K Goyal
3. Higher Engineering Mathematics ,S Grewel,Khana Publishers
4. Higher Engineering Mathematics,Ramana, Tata McGraw Hill
5. Engineering Mathematics,P.Kandasamy,S.Chand Group
6. Aggarwal BL.2003,BasicStatistics,New Age
- 7.Brookes CJ. Betteley IG and Loxston SM 1996, Mathematics and Statistics for chemists,John Wiley & Sons
8. Gupta SC &Kapoor VK 2003,Fundamentals of Mathematical Statistics, S.Chand& Sons
9. Gupta SP,2004 Statistical Methods, S. Chand &Sons

BOVS102 - FOOD CHEMISTRY

UNIT I WATER

5Hrs

Structure of water and ice, Physical constants of water Types of water, Water holding capacity and water binding capacity, Water activity

UNIT II -CARBOHYDRATES

20Hrs

Classification, Structure, Properties and Reactions of Carbohydrates

Monosaccharide

Classification. Optical Activity D-and L-forms. Muta-Rotation. Straight and Ring structure of glucose, fructose and galactose.

Oligosaccharides

Classification. Reducing & Non-reducing sugar. Glycosidic bonds. Structure of sucrose, maltose, iso- maltose & lactose .Inversion of sucrose.

Polysaccharides

Classification. Structure of starch, cellulose, glycogen, pectin. Difference between amylose & amylopectin .Gelatinization of starch. Gelation

Chemical Reactions of Carbohydrates

Reactions involving glycosidic-OH group. Reactions involving both glycosidic and alcoholic-OH group. Reactions involving alcoholic-OH group. Reactions involving both alcoholic OH and CHO/CO groups, Reactions of CHO/CO group. Browning reactions - Enzymatic & Non-enzymatic browning.

UNIT III - PROTEINS & ENZYMES

30 Hrs

PROTEINS : - Classification of amino acid- structure, essential and non essential amino acids, zwitter ion, isoelectric point, amphoteric property, Peptide bond. biological roles of protein. Classification of protein according to shape; classification of protein according to composition and solubility Structure of protein, chemical bonds involved in protein structure .

Physical-chemical properties of proteins; colour and taste, shape of size, molecular weight, colloidal nature, amphoteric nature, ion binding capacity, solubility, optical activity.

Denaturation-agents causing denaturation, changes occurring during denaturation

Chemical reaction-hydrolysis, Reactions involving COOH group, Reactions involving NH₂ group, Reactions involving both COOH group and NH₂ group. Reactions involving R groups or side chain.

ENZYMES

Introduction, classification of enzyme, enzyme kinetics, enzyme activity, factors affecting enzyme activity. Enzyme inhibitors- reversible (Competitive, Noncompetitive & Uncompetitive), irreversible Enzyme activators; regulation of enzyme activity- zymogens inactivation, covalent modification and feedback inhibition Enzymes used in food industry.

UNIT IV - LIPIDS

20 Hrs

Classification of lipids according to chemical composition, fatty acids; saturated and unsaturated fatty acids. Fatty acids-essential fatty acids, structure, chemical reactions of lipids: Reactions involving COOH group, Reactions involving double bond, reaction involving OH groups.

- Physical properties – Refractive index, melting point, smoke, flash and fire point, cold point, cloud point, colour, Solid fat index.
- Chemical properties- RM, P,K values Saponification value, iodine value, acid value
- Rancidity: Hydrolytic and oxidative rancidity; mechanism of auto oxidation of fat; reversion
- Antioxidants- natural and synthetic.
- Technology of edible fats and oils; hardening of fat hydrogenation and inter esterification

Unit V - FOOD PIGMENTS

15Hrs

Classification of food pigments, Chlorophyll, Myoglobin, anthocyanins, flavanoids, betalains, quinones and xanthenes, carotenoids.

Total Marks -100

Internal - 20

External – 80

Reference:

1.Food chemistry Fennema

2. Food chemistry Meyer

3. Fundamentals of Biochemistry Dr. J.L Jain

4. Introduction to the chemical analysis of foods: S. Suzanne Nielson.

5. Practical Biochemistry principles and techniques : Keith Wilson and John Walker

BOVS103 - FOOD CHEMISTRY PRACTICAL

1. Standardisation of HCl
2. Standardization of NaOH
3. Standardization of Sodium thiosulphate
4. Standardization of KMnO₄
5. Standardization of EDTA
6. Standardization of Fehling's solution
7. Estimation of glucose by Lane & Eynon's method
8. Estimation of sucrose by Lane & Eynon's method
9. Estimation of aldose by Willstatter's Iodimetric methods
10. Estimation of starch
11. Estimation of crude fibre
12. Paper chromatography
13. Estimation of carbohydrate by Anthrone method
14. Estimation of alpha amino nitrogen by Sorenson's Formaldehyde titration
15. Estimation of protein Kjeldahl method
16. Estimation of protein –Biuret method
17. Estimation of protein –Lowry method
18. Estimation of Saponification value
19. Estimation of Iodine value
20. Estimation of Acid value
21. Estimation of peroxide value
22. Estimation of vitamin C
23. Estimation of Fe

24. Estimation of Cu

25. Estimation of hardness of water.

Reference

- Biochemical methods 2nd edition : Sadasivasam, S. Manickam
- The chemical analysis of foods - David Pearson
- Handbook of Analysis and Quality Control for Fruit and Vegetable Products –S. Ranganna

SEMESTER – II

General Paper 1

Paper Code BOCG201

WRITING AND PRESENTATION SKILLS IN ENGLISH

MODULE – I

Letter Writing: Letters - letters to the editor - resume and covering letters -parts and layout of business letters-business enquiry letters offers, quotation-orders and execution-grievances and redressal-sales letters-follow-up letters-status enquiry-collection letters-preparation of power of attorney for partnership- job application letters-resume-CV-reference and recommendation letters-employment letters.

MODULE II

Other types of Academic and business Communication(written):Seminar papers- project reports - notices - filling application forms - minutes, agenda-reports-essays.

MODULE – III

Presentation Skills: Soft skills for academic presentations - effective communication skills – structuring the presentation - choosing appropriate medium – flip charts – OHP – Power Point presentation – clarity and brevity - interaction and persuasion.

**Compulsory activity: PowerPoint presentations to be conducted by each student in class*

MODULE IV

Non-verbal communication-Body language-Kinesics,Proxemics-Para language

Channels-Barriers-Principles of effective communication

MODULE V

Online writing and Netiquette- Writing e-mails- use of language – writing for blogs – social media etiquette- professional networking online (LinkedIn, E-factor etc.)

Compulsory activity: Each student should create a blog and/or profile in LinkedIn.

Books for Reference:

1- Marilyn Anderson, Pramod K Nayar and Madhucchandra Sen. *Critical Thinking, Academic Writing and Presentation Skills*. Pearson Education and Mahatma Gandhi

University.

2- Antony Thomas,Business Communication and MIS, Pratibha Publications.
Bhatia R.C.Business Communication

3- SaliniAgarwal Essential communication skill. Reddy P.N, and Apopannia, Essentials of
Business communication.

4- Sharma R.C,KRISHNA Mohan, Business Communication and Report writing
Leod,M.C.,Management Information system

Total Marks -100

Internal - 20

External – 80

BOVG201 - BASIC ORGANIC CHEMISTRY

Module 1-Stereochemistry of Organic Compounds

10Hrs

Geometrical isomerism- cis and trans configuration, determination of configuration and interconversion of cis-trans isomers, E and Z configuration .Optical isomerism- Optical activity, Chirality, Stereogenic Centre, Enantiomers and diastereomers, Racemisation
Conformation- Newman projection, Saw-horse projection, Conformations of Ethane, n-Butane, Cyclohexane.

Module 2- Mechanisms of Organic Reaction

15Hrs

Hybridization- sp^3 , sp^2 and sp , (ethane, ethene, ethyne). Polarity of bonds. Inductive, mesomeric, and hyperconjugative effects. Bond fission- homolytic and heterolytic fission. Reaction intermediates- radicals, carbocations and carbanions.

Classification of reagents- electrophiles, nucleophiles. Types of organic reactions – addition, substitution and elimination reactions. Substitution reactions: nucleophilic substitution of alkyl halides- S_N1 and S_N2 mechanisms. Electrophilic substitution in benzene-reaction mechanism.

Addition reactions: electrophilic addition to ethene, propene and ethyne-the Markwonikoff's rule, Peroxide effect.

Elimination reactions: E1 and E2 mechanisms

Module 3-Natural and Synthetic Polymers

15Hrs

Classification of polymers: Natural, synthetic; linear, cross-linked and network; plastics, elastomers, fibres; homopolymers and copolymers. Polymerization reactions, typical examples- polyethene, polypropylene, PVC, phenol-formaldehyde and melamine-formaldehyde resins, polyamides (nylons) and polyester. Plastics. Biodegradability of polymers, environmental hazards.

Module 4- Heterocyclic Compounds

10Hrs

Aromaticity – Huckel rule, preparation (any one method), properties, structure and aromaticity of furan, pyridine, indole, pyrimidine and purine.

Module 5: Pollution and its Control

10Hrs

Air pollution: Causes and effects Acid rain, adverse effects of acid rains, smog, green house effect, importance of green house effect on nature, Global warming, ozone layer depletion – causes and consequences, measures against air pollution.

Water pollution: Causes- organic, inorganic and macroscopic contaminants, effects of pesticides, insecticides and detergents on water pollution, water quality parameters-DO, BOD, COD., measures against water pollution.

Soil pollution-causes, effects and control measures, Noise pollution-effects of noise pollution, measures against noise pollution.

Total Marks -100

Internal - 20

External – 80

References

1. I. L. Finar, Organic Chemistry Vol. I , 6th edn. Pearson(Chapter2-4)
2. S. M. Mukherji, S. P Singh, R. P Kapoor, Organic Chemistry Vol.1,NewAge International(P) Ltd,2006(Chapter 2)
3. I. L. Finar , Organic Chemistry, 6th edn. Vol. I Pearson(Chapters 2,4,5,20)
4. Peter Sykes, A Guide Book to Mechanism in Organic Chemistry, 6th edn. Orient Longman,1988(Chapters 4,7,9)
5. S. M. Mukherji, S.P Singh, Reaction Mechanism in Organic Chemistry, Macmillan, Third Edn.,2003(Chapters 1,2,4,5,6,9)
6. V. R. Gowariker, Polymer Science, Wiley Eastern(Chapters 1,2,9)
7. S.Suzanne Nielsen, Food Analysis,3rd Edn. Aspen Publication
8. Keith Wilson, John Walker , Principles And Techniques of Practical Biochemistry, 5th edn. Cambridge

BOVG202 - NUTRITIONAL BIOCHEMISTRY

Unit I: **10Hrs**

The Cell: - Definition, prokaryotes and eukaryotes, major and minor cellular organelles and their functions.

Unit II: **15Hrs**

Carbohydrates:- Definition, Major carbohydrates and their biochemical functions – Glucose, fructose, galactose, lactose, maltose, sucrose, starch, glycogen, cellulose. Digestion and absorption of carbohydrate, Mechanisms of energy production - glycolysis, TCA cycle, Electron transport chain – Oxidative phosphorylation.

Unit III:- **15Hrs**

Fat :- categories of fat, biological importance of fat, Digestion and absorption of fat – exogenous and endogenous pathway, Biological functions of fat, Lipoproteins. Fatty acid synthase complex.

Proteins: - Essential and non essential amino acids, biological functions of proteins, digestion and absorption of proteins. Mechanism of protein synthesis - Transcription in prokaryotes. Translation in prokaryotes.

Unit IV:- **10Hrs**

Vitamins:- Classification, sources of fat soluble and water soluble vitamins. Physiological functions of fat soluble and water soluble vitamins, Deficiency disorders. Hypervitaminosis.

Minerals: - Classification of minerals. Sources of minerals, Physiological functions of minerals. Deficiency disorders.

Unit V:- **10Hrs**

Nutritional Biochemistry: - Energy value of foods, energy requirement, Methods used to determine the energy value of foods – Direct and indirect calorimetry, BMR, factors affecting BMR, Reference man and reference women. Protein deficiency diseases: Marasmus, Kwashiorkor, Marasmic Kwashiorkor. Evaluation of protein nutritive value – biological.

Total Marks -100

Internal - 20

External – 80

References:

1. Food Analysis – S.Suzanne Neilson
2. Harper's Biocheistry.
3. Genetics –Peter J Russel

BOVS201- FOOD PRESERVATION

Unit I **15Hrs**

Introduction to preservation –Importance and Principles of preservation. Thermal Processing- Principles and application–Blanching, Pasteurization, Sterilization, Aseptic processing, D value, F value, Zvalue.

Unit II **20Hrs**

High temperature preservation- Drying-Significance: Natural drying- Sun and Solar drying, Artificial drying- Hot air drying, Drum drying, Spray drying, Dehydrofreezing, Freeze drying, Drying pretreatments – blanching & sulphuring.

Unit III **20Hrs**

Low Temperature Processing- Refrigeration, Low temperature preservation of Fresh Fruits and Vegetables, Meat & Fish products. Chilling injury. Freezing, Principle, Freezing rate, Quick freezing, Slow freezing, Types of freezers- Air blast, Contact, Immersion, Fluidized bed and Cryogenic freezers. Quality of frozen foods- Retrogradation, Protein denaturation, Freezer burn.

Unit IV **20Hrs**

Irradiation-Source of ionization irradiation, Dose and Dosimetry, Mode of action, Scope of irradiation. Fermentation-Principles, Significance, Types of fermentation- Acetic, Lactic and Alcoholic.

Unit V **15Hrs**

Chemical Preservation-Natural preservatives-Mode of action. Chemical Preservatives - Sulphur dioxide, Benzoic acid, Sorbic acid, Propionic acid, Acetic acid. Recent Trends Food preservation

applications– Pulsed electric fields, High pressure technology, Ohmic heating, Microwave heating, Hurdle technology.

Total Marks -100

Internal - 20

External – 80

References

1. Fennema Owen R. Principles of food Science. Marcel Dekkar, Inc
2. Murano, Peter S. Understanding Food Science and Technology .Thomson
3. Khader, Vijaya Textbook on Food Storage and Preservation Kalyani Publishers
4. Pruthi JS Quick Freezing Preservation of Foods Allied publishers Limited
5. Potter N N.& Hotchkiss 1997 Food Science CBS Publishers
6. Desrosier NW James N,1977 Technology of Food Preservation CBS Publishers
7. Arti Sanhla Food Preservation. Principles and practices
8. Manay,N.S,Shadaksharaswamy,M.,Foods:New Age international (P) publishers, New Delhi 2004
9. Shafiur Rahman M., 1999, Hand book of food preservation. Marcel Dekker, Inc, New York.
10. Subbulakshmi G and Udippi S.A Food Processing and PreservationI Foods:New Age international (P) publishers, New Delhi 2001

BOVS202 - DAIRY TECHNOLOGY

Unit I

15Hrs

Definition, Composition- Composition of milk from various sources. Factors affecting composition of milk. Food and nutritive value. Physico-chemical Properties of milk.

Unit II

20Hrs

Processing of Milk - Collection, Processing, Distribution and Storage of liquid milk. Major Quality control tests for milk

Types of Milk - Toned, Double toned milk, Standardized milk, Homogenized milk, and

Recombined milk.

Unit III

20Hrs

Dairy Products

Cream - Composition, Processing, Storage and Defects

Butter - Composition, Processing, Storage and Defects

Ice cream - Composition, Processing, Storage and Defects

Cheese - Composition, Processing, Storage and Defects. Processing of cheese: Cottage and Cheddar.

Fermented milk Products- Curd, yoghurt, Acidophilus milk, Kefir, koumiss, Pro-biotic milk products

Dried milks – Whole Milk Powder and Skim Milk Powder. Composition, Processing, Storage and Defects

Unit IV

20Hrs

Indian Dairy Products – Kheer, Khoa, Rabri, Kulfi, Dahi, Srikhand, Panir, Chhana, Makkhan, Ghee, Lassi

Unit V

15Hrs

Dairy plant sanitation Objectives, CIP, Sanitizers

Total Marks -100

Internal - 20

External – 80

References

1. Sukumar D E. Outlines of Dairy Technology, Oxford University Press.
2. Johnson, Webb .Fundamentals of Dairy Chemistry.CBS Publishers and Distributers
3. Eckles, Clarence, Henry Milk and Milk Products, Tata MCGraw Hill publishers
4. Kurmann, Joseph A. Encyclopedia of Fermented Fresh Milk Products, CBS Publishers and Distributers
5. Atherton, Henry V. Chemistry and Testing of Dairy Products CBS Publishers and Distributers
6. Johnson, Webb Fundamentals of Dairy Chemistry CBS Publishers
7. Ananthkrishnan C P, Khan A Q, Padmanabhan P N. Technology of Milk Processing. Srilakshmi Publishers.
8. Walstra P, Geurts T. Dairy Technology. Marcel Dekker
9. Edgar Spreer. Milk and dairy product technology. Marcel Dekker

BOVS 203 - INTERNSHIP – I
DAIRY INDUSTRY

SEMESTER III

BOCG301 - PRINCIPLES OF MANAGEMENT

MODULE – I

10Hrs

Nature and Process of Management: Schools of Management Thought – Management Process School, Human Behavioural School, Decision Theory School, Systems Management School, Contingency School – Managerial Role – Basics of Global Management.

MODULE – II

15Hrs

Planning: Objectives – Types of plans - single use plan and repeated plan – MBO, MBE– strategic planning and formulation. Decision making - types and process of decision making – forecasting.

MODULE – III

15Hrs

Organising: Types of organisation - formal and informal, line and staff, functional – organisation structure and design – span of control, delegation and decentralisation of authority and responsibility – organisational culture and group dynamics.

MODULE – IV

10Hrs

Staffing: Systems approach to HRM – Performance appraisal and career strategy – HRD - meaning and concept. Recruitment, Selection, Induction training, Maintenance and Retrenchment

MODULE – V

10Hrs

Directing: Motivation – meaning - need for motivation. Theories of motivation - Herzberg and McGregor. Leadership- importance – styles of leadership, Managerial Grid by Blake and Mouton, Leadership as a Continuum by Tannenbaum and Schmidt, Path Goal Approach by Robert House (in brief) **Controlling** - Concept, Significance, Methods of establishing control.

Total Marks -100

Internal - 20

External – 80

Books for Reference:

1. Moshal.B.S . *Principles of Management*, Ane Books India,New Delhi.
2. Bhatia R.C. *Business Organization and Management*, Ane Books Pvt. Ltd., NewDelhi.
3. Richard Pettinger. *Introduction to Management* , Palgrave Macmillan, New York.
4. Koontz and O'Donnel. *Principles of Management* ,Tata McGraw-Hill Publishing Co.Ltd. New Delhi.
5. Terry G.R. *Principles of Management*, D.B.Taraporevala Sons & Co.Pvt.Ltd., Mumbai.
6. Govindarajan.M and Natarajan S. *Principles of Management*, PHI, New Delhi.
7. Meenakshi Gupta . *Principles of Management*, PHI, New Delhi.

BOVG301 - BIO ORGANIC CHEMISTRY

Module 1- Supramolecular Chemistry

10Hrs

Introduction. Molecular recognition. Host-guest interactions. Types of non-covalent interactions and molecular receptors. Role of molecular recognition in biopolymer (DNA and protein) structure organisation (elementary idea only).

Module 2- Vitamins, Steroids and Hormones

15Hrs

Structure and biological activity of fat soluble and water soluble vitamins.

Steroids- general introduction, cholesterol and bile acids.

Hormones (structure not required)- Introduction, steroid hormones peptide hormones, amine hormones, artificial hormones (general idea).

Module 3- Alkaloids and Terpenes

15Hrs

Essential oils- isolation, Isoprene rule. Elementary study of Citral and Geraniol.

Module 4- Chemistry and Agriculture

10Hrs

NPK representation, superphosphates, triple super phosphate ,uses of mixed fertilizers, micronutrients and their role, bio-fertilizers, plant growth hormones. Pesticides- classifications with simple examples, mention of biopesticides. Insecticides – stomach poisons, contact insecticides, fumigants. Method of preparation and use of DDT, BHC, pyrethrin. Herbicides- structure and function of 2, 4,-D and 2,4,5 –T Fungicides- inorganic and organic- Bordeaux mixture, dithiocarbamates Excessive use of pesticides – environmental hazards.

Module 5-Chemistry of Living cell

10Hrs

Thermodynamics of Living cell- Exergonic and endergonic reactions, coupled reactions, biological oxidation reactions (general idea)

Photosynthesis- Metalloporphyrin, chlorophyll, elementary idea of photophosphorylation.

Photosynthesis and respiration – comparison.

Biologically important molecules (structure not required): Haemoglobin – general functions of haemoglobin, transport of oxygen, pH of blood, myoglobin, cytochromes, Ferredoxine (elementary idea)

Total Marks -100

Internal - 20

External – 80

Reference

1. S.Suzanne Nielsen, Food Analysis,3rd Edn., Aspen Publication.
2. I. L. Finar, Organic Chemistry Vol. I , 6th edn. Pearson.
3. M.A.Aon, S. Cartassa, Dynamic Biological Organizations.

BOVG302 - FOOD PACKAGING TECHNOLOGY

Unit I

10Hrs

Definition, Functions, Primary, secondary and tertiary packaging. Flexible rigid and Semi- rigid packaging.

Unit II

15Hrs

Paper: Paper manufacturing, Paper bags and Wrappings, Corrugated board and Boxes. Merits and drawbacks

Metals- Aluminium, Coated Steels, Stainless steel, Metal Corrossion, Metal Container Manufacturing, Protective Laquers Merits and drawbacks

Plastic- Properties, Types of plastics, Food Packaging Polymers- LDPE, HDPE, LLDPE, HMHDPE, Polypropylene, polystyrene, polyamide, polyester, polyvinyl chloride. Merits and drawbacks

Unit III

15Hrs

Aseptic Packaging, Vacuum Packaging, Modified Atmospheric Packaging, Controlled Atmosphere Packaging

Unit IV

10Hrs

Tests for packaging materials –

Paper and paper boards – Thickness, Grammage, Bursting strength, Puncture resistance. Cobbs test, Tear resistance.

Plastics – Density, Tensile, Impact, WVTR, GTR, Overall Migration Residue

Shelf life testing of different packaged foods - Oxygen interactions , Moisture interchanges, Aroma permeability.

Unit V

10Hrs

Recent Trends in food packaging – Hyperbaric Storage, Shrink Package, Retort Pouch,

Thermoforming, Intelligent Packaging, Smart Packaging, Active Packaging

Food Packaging and labeling laws

- Food Safety and Standards (Packaging and Labelling).Regulation 2011
- Food Safety and Standards (Packaging) Regulation 2018

Total Marks -100

Internal - 20

External – 80

BOVS301 - POST HARVEST TECHNOLOGY – I

Unit I

15Hrs

Meat Processing: Humane method and Scientific methods, Inspection of meat- Antemortem and postmortem inspection, Slaughter of Cattle, sheep, pigs. Post mortem changes, aging, Factors affecting tenderness of meat, Effect of cooking on texture, colour and flavor.

Unit II

20Hrs

Meat Products: Cured Meat - Role of ingredients, Methods of curing, Processing of Ham, Bacon, Sausage - classification, processing, casings,

Unit III

20Hrs

Poultry

Poultry processing

Poultry meat products

Unit IV

20Hrs

Egg

Factors affecting egg quality, Measures of egg quality, Effect of cooking, Factors affecting coagulation, Industrial use of egg, Preservation of egg Refrigeration, Freezing, Thermal processing, Dehydration, Coating.

Unit V

15Hrs

Fish –

Processing Technology of fish – IQF, Block Frozen

Preservation of fish- smoking, pickling, canning, drying

Fish products and by products

Total Marks -100

Internal - 20

External – 80

BOVS302- FOOD ADDITIVES AND FOOD SAFETY STANDARDS

Unit I

15Hrs

Introduction to food additives – Definition of food additives, classification – direct and indirect, functions of food additives, E- numbering of food additives, GRAS, evaluation of safety of additives, unintentional additives,

Unit 2

20Hrs

Types of food additives

Need for food additives, Definitions, Functions of Preservatives, antioxidants, emulsifiers, stabilizers, chelating agents, humectants and flour improvers, pH control agents, antibiotics, thickening agents Curing agents- Mechanism of action with examples, colouring agents- Natural (chlorophyll, carotenoids, anthocyanins,, flavanoids, tannins,betalins, quinons and xanthones, lycopene) and artificial , flavouring agents- natural (terpenoids, flavanoids, sulphur compounds)and synthetic. Leavening agents –types- natural (air, steam) , chemical, biological, sweeteners- natural (Cane sugar, Gur,Raw sugar, Liquid sweetners) and artificial(saccharin ,acesulfame. Aspartame, sucralose, cyclamate, neotame, alitame, dulan). Evaluation of additives and food safety. Unintentional additives, radioactive fallout, agricultural contaminants, animal food additives., Acceptable daily intake.

Unit 3

20Hrs

Food Safety and Standards Act, 2006,

General Introduction to Food Safety Standard Act, FSSAI – Organizational chart and role of individual authority – Enforcement of the act – Food safety officers and their powers. Offences and penalties.

Unit 4

20Hrs

Food safety standard regulation

- General introduction about Food Safety Standard Regulation
- Food Safety and Standards (Licensing and registration of food business), Regulation 2011
- Food Safety and Standards (Food product standards and food additives) Regulation 2011

Unit 5

15Hrs

International Regulatory bodies - International food regulation bodies such as - Codex Alimentary Commission, World Health Organization, USFDA. , Food and Agriculture Organization.

Total Marks -100

Internal - 20

External – 80

Reference

- CAC Manual
- FSSA Standards And Regulations

BOVS303 - FOOD ADDITIVES PRACTICAL

1. Analysis of sulphur dioxide
2. Analysis of sorbic acid
3. Estimation of saccharin
4. Estimation of chlorophyll and carotenoid
5. Estimation of BHA
6. Estimation of PG
7. Estimation of iodine
8. Estimation of nitrate and nitrite
9. Estimation of sodium benzoate
10. Estimation of salt by Mohr's method
11. Estimation of peroxide value
12. Identification of food colours by paper chromatography

Reference

- FSSAI Analytical procedures

SEMESTER IV

BOCG401 - SOFTSKILLS AND PERSONALITY DEVELOPMENT

Total credit: 4

Maximum Hours: 60

Module – I

10Hrs

Personal Skills: Knowing oneself- confidence building- defining strengths- thinking creatively- personal values-time and stress management.

Module – II

15Hrs

Social Skills: Appropriate and contextual use of language- non-verbal communication- interpersonal skills- problem solving.

Module – III

15Hrs

Personality Development: Personal grooming and business etiquettes, corporate etiquette, social etiquette and telephone etiquette, role play and body language.

Module – IV

10Hrs

Presentation skills: Group discussion- mock Group Discussion using video recording - public speaking.

Module – V

10Hrs

Professional skills: Organizational skills- team work- business and technical correspondence- job oriented skills-professional etiquettes.

Total Marks -100

Internal - 20

External – 80

Books for Reference:

1. Matila Treece: Successful communication: Allyun and Bacon Pubharkat.
2. Jon Lisa Interatid skills in Tourist Travel Industry Longman Group Ltd.
3. Robert T. Reilly – Effective communication in tourist travel Industry Dilnas

Publication.

4. Boves. Thill Business Communication Today Meycans Hills Publication.
5. Dark Studying International Communication Sage Publication.
6. Murphy Hidderandt Thomas Effective Business Communication Mc Graw Hill.

BOVG401 - ADVANCED PHYSICAL CHEMISTRY

Module 1-Electrochemistry

10Hrs

Electrical conductance, Molar conductivity, strong and weak electrolytes, effect of dilution on conductivity, Kohlrausch's law, Faraday's laws of electrolysis, transport number, Hittorf's method, applications of conductance measurement, conductometric titrations, Ostwald's dilution law, hydrolysis of salts.

Module 2-Photochemistry

15Hrs

Introduction. Photochemical versus Thermal reactions. Electronic excitation and fate of excited molecules. Laws of photochemistry, photochemical processes-primary and secondary quantum yields, photosensitization and photosensitized reactions, photosynthesis, flash photolysis, chemiluminescence.

Frank Condon principle, Jablonski diagram. Fluorescence and phosphorescence.

Module 3:Surface chemistry and Colloids

15Hrs

Adsorption- Types of adsorption of gases by solids, factors influencing Adsorption, Freundlich Adsorption theorem-Langmuir Adsorption isotherm (derivation not required).

Colloids-preparation, properties- optical and electrical, Electrical double layer, coagulation, electrophoresis, electro osmosis, surfactants, micelle, application of colloids.

Surfactants-Soaps and detergents-Types of detergents- anionic, cationic, and non ionic.Cleansing action of soaps and detergents, Comparison between soaps and detergents, Environmental aspects.

Module 4: Chemical Kinetics**10Hrs**

Rate of reaction, rate equation, order and molecularity of reactions, determination of order of a reaction. Integrated rate expressions for first and second order reactions ($2A \rightarrow P$ and $A + B \rightarrow P$). Zero order reactions, pseudo order reactions, half life.

Effect of temperature on the rate of reaction: Arrhenius equation, concept of activation energy, importance of activated complex, Collision theory, Transition state theory, Chain reactions – steady state treatment, Catalysis: Homogeneous catalysis, enzyme catalysis – Michaelis – Menten equation (no derivation needed). Heterogeneous catalysis – Surface catalysis, Elementary idea about Autocatalysis. Examples.

Module 5: Redox Reactions**10Hrs**

Oxidation reduction reactions: explanation with examples, oxidation states rule to assign oxidation states in polyatomic molecules determination of oxidation states. Oxidation reduction titrations experimental method, examples.

Total Marks -100**Internal - 20****External – 80****References**

1. B.R. Puri, L.R. Sharma, M.S. Pathania, *Elements of Physical Chemistry*, 3rd edn. Vishal Pub. Co., 2008.
2. C.N.R. Rao, *University General Chemistry*, Macmillan, 2009.
3. S.Suzanne Nielsen, *Food Analysis*, 3rd Edn., Aspen Publication.

BOVG402 - POST HARVEST TECHNOLOGY – II**Unit I****10Hrs**

Wheat Milling of wheat, by products - Whole wheat flour, Maida, semolina, Gluten

Bread - Bread making –Role of ingredients, **Cake** - making, Role of ingredients

Biscuit - Biscuit making, Role of ingredients

Rice Milling of rice, by products of rice milling - Husk, Bran, Broken rice, Parboiling-Merits and demerits,

Corn Milling of Corn

Unit II

15Hrs

Legumes Processing

Oilseeds - Extraction, Refining

Unit III

15Hrs

Fruit and Vegetables – Harvesting, Processing, Storage

Ready To Serve Beverages – Formulation, Specification, Steps involved in processing Jam, Jelly, Marmalade, Squash, Tomato Puree, Tomato Ketchup

Unit IV

10Hrs

Spices - Definition, Classification, Chemical composition , Use of Spices.

Spice oil and Oleoresins—Definition

Technology of Tea and coffee,

UNIT V

10Hrs

Alcoholic beverages

Soft drinks

Sugar- manufacture, forms of sugar, by products of sugarcane

Jaggery, Honey, confectionary

Total Marks -100

Internal - 20

External – 80

REFERENCES:-

1. Sacharow, S., Griffin, R.C. Food Packaging. AVI Publishing Company, West Port, Connecticut. 2000.

2. Davis, E.G. Evaluation of tin & plastic containers for foods. CBS Publishers, New Delhi. 2004.

3. Dong Sun Lee, Kit L. Yam, Food Packaging Science and Technology. CRC Press Taylor & Francis Group, 2008

3. Cruess, W.V. Commercial Fruit & Vegetable Products. Allied Scientific Publishers, Delhi. 2003.

BOVS401 - FOOD MICROBIOLOGY (T)

Unit I

15Hrs

Sterilisation and Disinfection – Physical agents – sunlight, heat, drying, Filtration, Radiation, Chemical agents: Alcohols, aldehydes, dyes, halogens, phenols, gases, surface active agents, metallic salts, thermal death point, thermal death time, D-value, Z-value.

Unit II

20Hrs

Morphology and general characteristics of bacteria, fungi, algae, viruses and protozoa, Introduction to microscope, culture media – differential media, selective media, transport media, pure culture, microbial culture techniques – lawn, stab, swab. Pure culture techniques – pour, spread and streak plate method.

Unit III

20Hrs

Staining characteristics, Factors affecting microbial growth – temperature, p^H , oxygen concentration, water activity, psychrophiles, halophiles, mesophiles, thermophiles, thermoacidophiles, Growth curve – lag, log, stationary, decline phase

Unit IV

20Hrs

Spoilage of food – fruits and vegetables, meat and meat products, canned foods, milk and milk products, Egg, Fish, Cereals, Sugar and sugar products and Poultry.

Beneficial microorganisms in food. Manufacture beer, wine and vinegar. Fermented milk products – cheese, kefir, butter milk, acidophilus milk, yoghurt

Food-borne illness – Salmonellosis, shigellosis, campylobacteriosis , listeriosis and intoxication
– botulism and staphylococcus food intoxication.

Unit V

15Hrs

Degradation of xenobiotics in the environment, bioremediation, bioaugmentation, bioaccumulation, Composting, Microbial production of solvents (acetone, ethanol, butanol), organic acid (citric acid, acetic acid, gluconic acid), SCP, Waste water treatment – preliminary, secondary and tertiary.

Total Marks -100

Internal - 20

External – 80

References

1. Food Microbiology, William C Frazier, Dennis C Westhoff
2. Food Microbiology , Adams
3. Microbiology, Prescott , Harley and Klien
4. Microbiology , Michael J Pelczar, Chan and Kreig
5. Textbook of Microbiology , Ananthanarayanan and C.K.J.Panicker

BOVS402 - FOOD MICROBIOLOGY PRACTICAL

Unit I

Study of compound microscope

- Working and handling of microscope for slide examination
- Working and handling of other microbiological laboratory instruments and materials.

Unit II

Staining techniques

- Preparation of bacterial smear
- Gram staining
- Spore staining
- Capsule staining
- Monochrome staining

- Negative staining

Unit III

Biochemical reactions

- Indole test
- Methyl red test
- Vogues Proskauer test
- Citrate utilization test

Unit IV

Demonstration of bacterial motility by hanging drop mount method

Unit V

Isolation , enumeration and characteristics of microorganisms, microbiological analysis of foods-

1. Meat and meat products
2. Fish and sea foods
3. Fruit and vegetables
4. Milk and milk products

Reference

- Dubey, R.C and Maheshwari, O.K (2005) : Practical Microbiology
 - Aneja, K.R (2003): Experiments in Microbiology, Plant Pathology and Biotechnology (4th edition)
-

BOVS403 - INTERNSHIP II

SEMESTER V

General Paper 1

Paper Code BOCG501 Environmental Studies

AIM

- To bring in proper awareness among the students on Environmental Issues

OBJECTIVES

- To built a pro-environmental attitude and a behavioral pattern in society based on sustainable lifestyles
- To impart basic knowledge on pollution and environmental degradation.

MODULE 1

(15 hrs)

Introduction to Environment Science : Development and Environment

Human Population and the Environment : Population growth, variation among nations-Population explosion –Case Studies.

Sustainable Development – Concept, Policies, Initiatives and Sustainability strategies, Human Development Index, Gandhian Principles on sustainability.

Natural systems

Earth –structure, soil formation- factors affecting, soil types

Atmosphere – structure and composition

Hydrosphere – Oceans, rivers, estuaries, Lakes etc.

Physical environment of aquatic systems

Resource utilization and its impacts on environment

Renewable and non-renewable resources

Forest resources : Use and over-exploitation, Timber extraction, mining, dams and their effects on forest and associated biota.

Water resources : Use and over-utilization of surface and ground water, conflicts over water, River valley projects and their environmental significance- Case studies – Sardar Sarovar

Mineral resources : Use and exploitation, environmental impacts of extraction and use of mineral resources,

case studies – sand mining, metal mining, coal mining etc.

Food resources : World food issues, changes caused by - overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, and salinity. Case studies

Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

Land resources : Land as a resource, land degradation, soil erosion and desertification.

MODULE 2

(15 hrs)

Ecosystems

Concept of an ecosystem-Structure and function of an ecosystem-Producers, consumers and decomposers-Energy flow in the ecosystem-Ecological succession-Food chains, food webs and ecological pyramids.

Ecological interactions Types, characteristic features, structure and function of the following ecosystem : Forest, Grassland, Desert, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Significance of wetland ecosystem – Classification, Ecology and Biogeochemistry. Threats and Management

Biodiversity and its conservation

Introduction – Definition : genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation Hot-spots of biodiversity, Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts., Endangered and endemic species of India, Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. People's participation in biodiversity conservation- Biodiversity Register; Global Climate change and Biodiversity.

MODULE 3

(15 hrs)

Environmental Pollution

Air pollution: sources- mobile, stationary, fugitive; type of pollutants- primary and secondary air pollutants, Smog- classical smog and photochemical smog, Acid rain; Ozone depletion; impacts of air pollutants on environment; control measures.

Water pollution: Sources- Point and non-point sources; Types – chemical, biological and physical; impacts on the environment; water quality – water quality standards ; control measures.

Soil pollution: sources and impacts

Noise pollution: sources, impacts on health, management strategies

Thermal pollution and Nuclear pollution - sources and impacts

Solid wastes – types, sources, impacts on Environment.

Municipal Solid waste Management: Essential steps- source segregation , collection ,Processing and Disposal of residues.

Environmental Pollution - case studies

Natural and anthropogenic Disasters and their management : floods, earthquake, cyclone and landslides.

MODULE 4

(15 hrs)

History of environment protection

Silent spring, Ramsar Convention, Stockholm conference, Montreal protocol, Kyoto protocol, earth summit, Rio+10, Rio+20

Brundtland commission Report, Sustainable development

Environmental movements in India

Global initiatives for Environmental protection

Environmental education –basics

Tblisi conference,

Environment Management Systems

Environment Information Systems

Environmental Impact assessment (EIA) – definition and significance, EIA notification; National and state level Authorities; role of public in EIA of a development project

Social Issues and the Environment

Environmental movements

From Unsustainable to Sustainable development-Urban problems related to energy-

Water conservation- Rain water harvesting; Watershed management

Environmental ethics : Issues and possible solutions.

Environmental Economics

Green house effect and Climate change

Natural and Anthropogenic disasters

Disaster Management

Wasteland reclamation-Consumerism and waste products-

Environmental Laws – General introduction; Major laws in India.Environment Protection Act-Air (Prevention and Control of Pollution) Act-Water (Prevention and control of Pollution) Act-Wildlife Protection Act-Forest Conservation Act-Issues involved in enforcement of environmental legislation-Public awareness

TEXT BOOK

Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education - Erach Bharucha for University Grants Commission

Further activities

- Field work
- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural/ Solid waste dump yards
- Study of common plants, insects, birds.

- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

Total Marks -100

Internal - 20

External – 80

BOVG501 - ANALYTICAL INSTRUMENTATION

Module 1- Chromatographic Techniques 15Hrs

Chromatography- Principle of differential migration. Classification of chromatographic methods. Basic principle and uses of Thin Layer chromatography (TLC), Paper chromatography (PC), Rf value, Column Chromatography, Gas chromatography (GC), High performance Liquid Chromatography (HPLC), Ion Exchange chromatography (IEC).

Module 2- Basic Principles of Electrophoresis 10Hrs

General principles of electrophoresis. Support media. Electrophoresis of proteins, nucleic acids, immune electrophoresis. Factors affecting electrophoresis. Gels in electrophoresis.

Module 3-Types of Electrophoresis 10Hrs

Types of electrophoresis: SDS PAGE, Agrose gel electrophoresis, Native gel electrophoresis, Gradient gel electrophoresis, Isoelectric focusing gels, Two dimensional polyacrylamide gel electrophoresis, protein (western)blotting. Detection, estimation and recovery of proteins in gels.

Module 4 - Basic Principles of Spectroscopy 10Hrs

Spectroscopy: Energy level transitions in spectroscopy, Interference, Energy states of matter, Basic principles: absorption of radiation, Emission of radiation.

Module 5 - Types of Spectroscopy 15Hrs

Beer – Lambert’s Law, Basis of quantitative absorption spectroscopy, Deviations from Beer’s Law, Procedural considerations, Calibration curves, Principle and instrumentation for UV – Visible, Atomic absorption spectroscopy, Atomic Emission Spectroscopy, Mass spectroscopy.

Total Marks -100

Internal - 20

External – 80

Reference:

1. Chemical Analysis of foods –S. Suzanne Nielsen
2. Introduction to Spectroscopy – Pavia.
3. Practical Biochemistry – Keith Wilson

BOVG502 - SENSORY ANALYSIS OF FOOD

Unit I

10Hrs

INTRODUCTION TO SENSORY EVALUATION AND QUALITY

Attributes –Definition, importance of sensory evaluation, sensory characteristics of food – appearance, flavor, texture and additional quality factors.

Unit II

15Hrs

PRACTICAL REQUIREMENTS AND GENERAL TESTING CONDITIONS

Testing area, testing set up, lighting, testing schedule, preparation of samples, sample coding, evaluation card preparation, panel members.

Unit III

15Hrs

SENSORY ASSESSMENT OF FOOD QUALITY

1. TASTE (GUSTATION)

Introduction importance of gustation, Chemical dimensions of basic tastes- sweet, bitter, sour, salt and umami, Taste enhancers, perception of taste.

2. ODOUR AND FLAVOR (OLFACTION)

Introduction and importance of odour and flavor, smelling techniques- Vonskramlk Test

3. COLOR

Introduction and importance of color, Dimensions of color, perception of color, instruments used for colour measurements.

4. TEXTURE

Introduction, definition and importance, Texture classification, Texture measurement, instruments used for texture measurement.

Unit IV

10Hrs

SENSORY TESTING OF FOODS

1. Threshold tests,
2. Descriptive test
3. Discriminative tests,
4. Ranking tests,
5. Hedonic tests,
6. Acceptance and preference tests,
7. Scoring tests
8. Sensitivity tests

Unit V

10Hrs

DATA ANALYSIS

Importance of data analysis, tests of significance, null hypothesis, mean, median, Variance, standard deviation, t-test, chi-square test

Total Marks -100

Internal - 20

External – 80

Reference:

1. Jellinek, G., Sensory Evaluation of Food-Theory and Practice. Elis Horwood Ltd., England., 1985.
- 2.Srilakshmi,B., Food Science., New Age International (P) Limited., NewDelhi.,2005.
- 3.Manay,S., Shadaksharaswamy,M., Food Facts and Principles, New Age International (P) Limited., New Delhi., 2008

BOVS501 - FOOD TOXICOLOGY**UNIT I- INTRODUCTION TO TOXICOLOGY 15Hrs**

Definition- Toxicology- importance- scope – basic divisions- Goals- Basic concept of Toxicology

UNIT II- NATURALLY OCCURRING TOXICANTS IN VARIOUS FOODS 20Hrs

Toxicants in Plant foods- Seafood toxins- Antivitamins- Radioactive metals in foods- Toxic minerals- other inorganic compounds occur in Food & Water

UNIT – III TOXICANTS OF PUBLIC HEALTH HAZARD 20Hrs

Chemical contaminants- pesticide residues- types of pesticides- automobile emissions(CO, SO₂, NO), Hydrocarbons- photochemical products- heavy metals(Mercury, Arsenic, Lead, Cadmium, Aluminium, Tin), Food additives- types- health hazards- radioactive substances-kinds of radiators- sources of radiations- biological effect of radiations

UNIT IV- XENOBIOTICS & CARCINOGENS 20Hrs

Absorption, Assimilation, utilization and excretion of xenobiotics- Biotransformation- Phase I and Phase II-Types- Mechanism of chemical carcinogens-mutagens and Teratogens

UNIT V- SUBSTANCES INTENTIONALLY ADDED TO FOODS 15Hrs

Antioxidants- colors-stabilizers –GM Foods and their safety. Food safety and standards (contaminants, toxins and residues) Regulation 2011.

Total Marks -100

Internal - 20

External – 80

REFERENCES:

1. B.Jacob, Chemical analysis of food and food products by Morris, 3rd edtn,
2. Nutritional and Toxicological aspects of food processing edt. Walker and E.Quattrucci
Tayloss and Francis New York 1980
3. FSSA Regulation

BOVS502 - FOOD ANALYSIS – I

Unit I

15Hrs

Sampling:- Terminologies in sampling, Selection of sampling procedures, Factors affecting choice of sapling plan, Sampling procedures – manual verses continues sampling, probability and non – probability sampling, General size reduction considerations – Grinding, Enzyme inactivation, lipid oxidation protection, microbial growth and contamination.

pH and titratable acidity:- Acid base equilibria, General principles, Reference electrode, Indicator electrode, combination electrodes, Buffers, Potentiometric titration, Indicators, standard alkali, standard acid, sample analysis, acid content in food.

Unit II

20Hrs

Moisture Assay: - Importance of moisture assay, forms of water in food, sample collection and handling, removal of moisture, decomposition of other food components, temperature control, types of pans for oven drying, handling and preparation of pans. Oven drying methods – forced draft oven, vacuum oven, microwave oven, infra red drying. Distillation methods – reflux distillation with miscible solvent. Chemical method – Karl Fischer titration. Hydrometry – Pycnometer, hydrometer, westphal balance.

Unit III

20Hrs

Analysis of fat:-Continuous solvent extraction methods: Gold fish method, Semi continuous solvent extraction methods: Soxhlet method, Discontinuous solvent extraction method: Mojonnier method. Non Solvent wet extraction method: Babcock method, Gerber method. Detergent method.

Fat characterization:- Refractive index, melting point, Solid fat index, Cold test, Cloud point, Smoke, flash and fire point Iodine value, Saponification number, Acid value.

Unit IV

20Hrs

Analysis of Carbohydrates: -

Chemical methods: - Importance of analysis of carbohydrates, sample preparation, Extraction of mono and oligosaccharides, removal of interfering compounds: clarification with lead acetate and ion exchange resins. Chemical methods for the analysis of carbohydrates: Lane and Eynon's method, Munson and Walker method, Nelson- Somogyi method, Alkaline ferricyanide method, Phenol Sulfuric acid method and Anthrone method.

Enzymatic method:- D - Glucose/D - Fructose/ D - Sorbitol method, Lactose/ D – Galactose method, Maltose/Sucrose/ D – Glucose method, Raffinose method and Oxidase method.

Physical methods:- Polarimetry, Refractive index measurement, specific gravity measurement: pycnometer, westphal balance and hydrometer. Analysis of carbohydrates using HPLC, analysis of starch, cellulose, pectic substances and hemicelluloses.

Unit V

15Hrs

Analysis of Proteins:- Importance of protein analysis, principle and procedure of : -Kjeldahl method, Biuret, Lowry, Bicinchoninic acid, UV 280 nm, Dye binding method, Ninhydrin method, Turbidimetric method.

Protein separation and characterization methods: - Separation by differential solubility, separation by adsorption, separation by size, separation by electrophoresis – PAGE, Isoelectric focusing, capillary electrophoresis.

Total Marks -100

Internal - 20

External – 80

Reference:

1. Introduction to the chemical analysis of foods: S. Suzanne Nielson.
2. Practical Biochemistry principles and techniques : Keith Wilson and John Walker
3. Introduction to the chemical analysis of foods: S. Suzanne Nielson.
4. Practical Biochemistry principles and techniques : Keith Wilson and John Walker

BOVS503 - FOOD ANALYSIS –I PRACTICAL

Total credit: 6

Maximum Hours: 90

1. ANALYSIS OF MILK

- Milk Solids,
- Ash
- Fat
- Protein
- Lactose
- Acidity

Qualitative test

- MBRT Test
- Starch
- Sucrose
- Urea
- Formalin

2. ANALYSIS OF FRUIT JUICE:

- Total solids
- Ash
- Water insoluble ash, Water soluble ash, Alkalinity water soluble Ash
- Acidity
- Total Sugar
- Soluble solids(Refractive index)
- Qualitative tests- potassium metabisulphite, sodium benzoate

3. ANALYSIS OF CONDENSED MILK

- Total Solids
- Fat

- Acidity
- Estimation of lactose and estimation of sucrose
- Qualitative tests- sucrose, starch

4. ANALYSIS OF VINEGAR

- Total solids
- Acidity
- Specific gravity
- Qualitative tests

5. ANALYSIS OF HONEY

- Moisture
 - Estimation of reducing sugar
 - Acidity
 - Specific gravity
 - Qualitative tests

6. ANALYSIS OF WINE

- Specific gravity
- Suspended solids
- Dissolved solids
- Total solids
- Total acidity

7. ANALYSIS OF SPICES

- Moisture
- Alcoholic extract
- Ash
- Acid insoluble ash
- Volatile Oil

8. ANALYSIS OF BEER

- Fixed Acidity
- Volatile acidity
- Alcohol content and Original gravity

9. ANALYSIS OF BUTTER

- Moisture
- Refractive index
- RMPK value

- Iodine value
- Total fat
- Curd and salt

10. ANALYSIS OF COFFEE

- Moisture
- Ash
- Total Extractives
- Caffeine
- Chicory
- Qualitative Tests

11. ANALYSIS OF TEA

- Moisture
- Ash
- Total Extractives
- Caffeine
- Tannin
- Qualitative Tests

12. ANALYSIS OF JAM

- Acidity
- Insoluble solids and fruit content
- Soluble solids
- Sugar
- Pectin

13. ANALYSIS OF WHEAT FLOUR

- Moisture
- Ash
- Gluten
- Crude Fibre
- Sedimentation value
- Water Absorption power

14. ANALYSIS OF WATER

- Total hardness
- Chloride
- Magnesium

15. DETECTION OF ADULTERATION IN VARIOUS FOODS

- Milk
- Condensed milk
- Honey
- Squash
- Vinegar
- Wine

- Spices
- Ketchup

Reference :

- Handbook of Analysis; QC for Fruits & Vegetable Products
- E.M.Master; Standard Methods for examination of Dairy Products
- Jacob; Chemical methods of Food Analysis
- FSSAI Analysis Procedures.

SEMESTER VI

BOCG601 - ENTREPRENEURSHIP DEVELOPMENT

Module – I

10Hrs

To make the students understand about entrepreneurs and different classifications. Entrepreneur and entrepreneurship - Definition; traits and features; classification; Entrepreneurs; Women entrepreneurs; Role of entrepreneur in Entrepreneurs in India.

Module – II

15Hrs

Create an awareness about EDP. Entrepreneurial development programme concept; Need for training; phases of EDP; curriculum & contents of Training Programme; Support systems, Target Groups; Institutions conducting EDPs in India and Kerala.

Module – III

15Hrs

General awareness about identification of project financing new enterprises. Promotion of a venture; opportunity Analysis Project identification and selection; External environmental analysis economic, social, technological and competitive factors; Legal requirements for establishment of a new unit; loans; Overrun finance; Bridge finance; Venture capital; Providing finance in Approaching financing institutions for loans.

Module – IV

10Hrs

To identify different business opportunities in small business. Small business Enterprise - Identifying the Business opportunity in various sectors - formalities for setting up of a small business enterprise - Institutions supporting small business enterprise - EDII (Entrepreneurship Development Institute of India), SLDO (Small Industries Development Organization NSIC (National small Industries Corporation Ltd. (CNSIC) NIESBUD (National Institute for Entrepreneurship and small Business Development) Sickness in small business enterprise causes and remedies.

Module – V

10Hrs

To understand about a project report relating to a small business. Project formulation - Meaning of a project report significance contents formulation planning commissions guidelines for formulating a project report - specimen of a project report, problems of entrepreneurs case studies of entrepreneurs.

Total Marks -100

Internal - 20

External – 80

Books for Reference:

1. Clifton, Davis S. and Fylie, David E., Project Feasibility Analysis, John Wiley, New York, 1977.
2. Desai A. N., Entrepreneur and Environment, Ashish, New Delhi, 1990.
3. Drucker, Peter, Innovation and Entrepreneurship, Heinemann, London, 1985
4. Jain Rajiv, Planning a Small Scale Industry: A guide to Entrepreneurs, S.S. Books, Delhi, 1984
5. Kumar S. A., Entrepreneurship in Small Industry, Discovery, New Delhi, 1990

McClelland, D. C. and Winter, W. G., Motivating Economic Achievement, Free Press, New York, 1969

BOVG601 - FOOD ENGINEERING

Unit I**10Hrs**

Dimensions and units, Basic physical quantities: velocity and speed, acceleration, force and momentum, weight, pressure. Work and energy, power.

Unit II**15Hrs**

Fundamentals of fluid flow, Properties of fluids, density, viscosity, Handling system for Newtonian liquids – Continuity equation, Reynolds number, Entrance region and fully developed flow, Velocity profile. Measurement of fluid flow, Pitot tube.

Unit III**15Hrs**

Principles of heat transfer, heat exchangers, Thermal properties of food, specific heat, thermal conductivity, thermal diffusivity, Modes of heat transfer: conduction, convection, and radiation, Conductive heat transfer in rectangular slab.

Unit IV**10Hrs**

Separation processes: centrifugation, filtration, Mechanical operations: mixing of liquid and solid food materials, size reduction of liquid and solid food materials, Extrusion

Unit V**10Hrs**

Refrigeration: selection of refrigerant, components of a refrigeration system, advantages and disadvantages. Freezing: types of freezing, theories of freezing, Drying: Theories of drying, types of driers, Merits and demerits of drying.

Evaporation: Types of evaporators.

Total Marks -100**Internal - 20****External – 80****References:**

1. Introduction to food engineering, 4th edition, R. Paul Singh & Dennis R. Heldman, Elsevier publications.
2. Singh, R.P., 2004, Introduction to Food Engineering 3rd edition. Academic Press, London.

BOVG602 - FOOD SAFETY MANAGEMENT SYSTEMS

Total credit: 4	Maximum Hours: 60
UNIT I	10Hrs
HACCP- Prerequisites; Identification of PRP' s	
UNIT II	15Hrs
Principles and steps of HACCP Plan	
UNIT III	15Hrs
Quality Management System- ISO 9001, ISO 14000 – Environmental management system	
UNIT IV	10Hrs
Food Safety Management System ISO 22000-2005, ISO/IEC 17025:2005 Testing And Calibration of Laboratories	
UNIT V	10Hrs
BRC, IFS, SQF, USFDA	
Total Marks -100	
Internal - 20	
External – 80	

Reference Books

- Early R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.

- Krammer A & Twigg BA. 1973. Quality Control in Food Industry. Vol. I, II. AVI Publ.
- ISO 9001, ISO 22000, ISO:IEC 17025, BRC :IFS, SQF, USFDA STANDARDS

BOVS601 - FOOD ANALYSIS – II

Unit I: **15Hrs**

Ash analysis: Importance of ash in food analysis, sample preparation, Dry ashing, wet ashing, low temperature plasma ashing, applications of ash analysis. Soluble and insoluble ash in water, ash insoluble in acid, alkalinity of ash.

Analysis of Minerals:- Importance of analysis of minerals, sample preparation, Interferences, Gravimetric analysis for calcium, EDTA complexometric titration for the analysis of calcium, iron determination using redox reaction, colorimetric analysis of phosphorus, analysis of salt in butter by Mohr's method.

Unit II: **20Hrs**

Fiber Analysis: - Importance of dietary fiber, major components of dietary fiber, gravimetric method, principle, procedure and application of total soluble and insoluble fiber, Chemical methods –principle, procedure and application of Englyst – Cummings procedure.

Analysis of extraneous matter: -Importance of analysis of extraneous matter, definition of terms – extraneous materials, filth, heavy filth, light filth, sieved filth, analysis of foreign matter in spices and condiments – sieving method, Filth in shelled nuts – heavy filth by sedimentation.

Unit III:- **20Hrs**

Pigment analysis:- Importance of colour and food quality. Presence and distribution of pigments in foods. Basic principles in handling and storage of pigments. Analysis of chlorophyll, carotenoids, anthocyanins, myoglobins, betalains.

Unit IV:- **20Hrs**

Analysis of Vitamins : -Importance of analysis of vitamins, Extraction methods for vitamins, Bio assay method for vitamin D, microbiological assay for niacin, Carr – Price method for

Vitamin A, 2,6 Dichlorophenol indophenol titrimetric method for vitamin C, Fluorometric method for the analysis of riboflavin and thiamine. HPLC method for the analysis of Vitamin D.

Unit V:-

15Hrs

Analysis of Pesticides: -

General considerations, types of analytical methods, pesticide residues, multiresidue methods, single residue methods, and quantitative methods – sample handling sample preparation, extraction, cleanup, derivitisation, automated chromatographic separation, quantitation, separation by thin layer chromatography.

Total Marks -100

Internal - 20

External – 80

Reference:

Food analysis – S. Suzanne Nielsen

BOVS602 - FOOD ANALYSIS II PRACTIACL

Total credit: 6

Maximum Hours: 90

1. Estimation of Retinol by carriprice method
2. Estimation of Vitamin D by HPLC
3. Estimation of Vitamin E by flourimetry
4. Estimation of Vitamin K by flourimetry
5. Estimation of Vitamin C by 2, 6 dichloro indophenol titrimetric method
6. Estimation of Thiamin by fluorimetry
7. Estimation of Riboflavin by flourimetry
8. Estimation of Niacin by fluorimetry / HPLC
9. Estimation of Mercury by atomic absorption spectrometry
10. Estimation of Cadmium by atomic absorption spectrometry
11. Estimation of Lead by atomic absorption spectrometry

12. Estimation of Zinc by Flame photometer
13. Estimation of Copper by Flame photometer
14. Estimation of Iron by Flame photometer
15. Estimation of Calcium by complexometry
16. Estimation of Iron by Wong's method
17. Multiresidue Gas Chromatographic Method for Determination of Organochlorine and Pyrethroid pesticides in Milk, Fish and Eggs.

Reference :

- Food analysis IIIrd edition : S.Suzanne Nielsen
- FSSAI Analytical procedures

**BOVS603 - INTERNSHIP III
PROJECT**

MODEL QUESTION PAPERS

FIRST SEMESTER MODEL QUESTION PAPERS

General paper 1

Paper Code – BOCG101-LISTENING AND SPEAKING SKILLS IN ENGLISH

Part A

Answer *any 10* questions. Each question carries 2 marks.

1. Describe an auto rickshaw.
2. What is intensive reading?
3. What is the difference between a definite article and an indefinite article?
4. What is rising tone?
5. What is an index?
6. What is a phrasal verb?
7. Who is a good reader?
8. What is an embedded question?
9. Write a few phrases which can be used to express mild disagreement.
10. What are the three functions of conjunctions?
11. What are grammatical words?
12. What are people skills?

Part B

Answer *any 6* questions. Each question carries 5 marks.

13. What is telephone etiquette?
14. Who is an active listener?
15. Prepare a vote of thanks to be presented for the residents' association meeting.
16. Write short note on conjunctions.
17. What are the features of fluent speech?
18. You are a project leader. Introduce the members of your team to a visiting dignitary.
19. Write a short note on reading for a purpose.

20. What are the steps in cancelling and rescheduling appointments?
21. Describe the qualities of your college to your friends.

Part C

Answer *any 2* questions. Each question carries 15 marks.

22. Discuss 'the importance of social media' with two other participants in a group discussion.
23. a) Write a conversation with your panchayath member, complaining about the lack of streetlights.
b) Write a model interview you make with an actor.
24. Write a note on subject-verb agreement.
25. What are the roles and functions in a group discussion?

B.Voc. DEGREE MODEL QUESTIONS

First semester

BOVG 101-BASIC THEORETICAL AND ANALYTICAL CHEMISTRY

Time: 3 Hrs

Maximum Marks: 80

Section A

(Short note Answer Questions)

Answer *Any ten* Questions.

Each Question Carries 2 Mark.

(2 X 10 = 20)

1. What is Hund's rule of maximum multiplicity?
2. What is a buffer solution? How does a mixture of acetic acid and sodium acetate act as a buffer?
3. Distinguish between orbit and orbital.
4. Calculate the molarity of sodium carbonate solution prepared by dissolving 0.53g pure anhydrous Na_2CO_3 in 500ml of distilled water.
5. State Aufbau principle.
6. What is redox titration? Explain the principle involved in it using chemical equations.

7. What is Heisenberg's uncertainty principle?
8. State and explain Lowry-bronsted concept of acids and bases.
9. Differentiate between accuracy and precision.
10. Define the term Entropy.
11. What is meant by spontaneous reaction?
12. Explain the principle involved in paper chromatography.

Section B
(Descriptive type Answer Questions)

Answer *Any six* Questions
Each Question Carries **5 Mark**

(5 X6 = 30)

13. Explain photoelectric effect.
14. What is de Broglie wavelength? Calculate the wavelength associated with a bullet of mass 1g travelling with a velocity of $3 \times 10^2 \text{ms}^{-1}$. ($h=6.62 \times 10^{-34} \text{Js}$)
15. State Pauli's exclusion principle. Based on this principle show that the maximum number of electrons that can be accommodated in an orbital is 8 when $n=2$.
16. Explain the hybridization and geometry of acetylene molecule.
17. Discuss briefly on valence band theory of chemical bonding. What are its main limitations?
18. What is meant by common ion effect? Explain three of its applications.
19. Discuss the basic principle and method involved in chromatographic separation using HPLC
20. Discuss the principles of gravimetric analysis.
21. Discuss briefly on ion exchange chromatography.

Section C
(Essay Type Questions)
Answer *Any Two* Questions.
Each Question Carries **15 Marks**.

(2 X 15 = 30)

22. Write briefly on different types of distillation techniques and their applications.
23. Explain the significance of each quantum number. How are they related to each other?

24. What are the common errors in quantitative analysis? Explain the methods for their elimination.
25. Discuss the advantages and limitations of the Arrhenius, Lowry-Bronsted and Lewis concepts of acids and bases.

MODEL EXAMINATION, MARCH 2019

BVOC – FIRST SEMESTER

BOYS 101- GENERAL MATHEMATICS AND STATISTICS

TIME – 3 HOURS

MAXIMUM MARKS: 80

PART – A

(Answer any 10 questions .Each question carries 2marks)

1. Find the derivatives of $\tan(2x+3)$
2. Evaluate the derivative i) $\frac{e^x}{\sin x}$ ii) e^{x^3}
3. Define symmetric matrix with example.
4. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 3 & -1 & 3 \\ -1 & 0 & 2 \end{bmatrix}$. Find $2A-B$
5. Construct a 2×2 matrix, $A = [a_{ij}]$ whose elements are given by $a_{ij} = \frac{(i+2j)^2}{2}$
6. Show that $[A^T]^T = A$ using example.
7. Find Mode 40, 25, 60, 35, 81, 75, 90, 10.
8. State the advantages of Arithmetic Mean.
9. Differentiate between Histogram and bar diagram.
10. Evaluate $\int \frac{x^3-1}{x^3} dx$
11. Find i) $\int (\sin 2x - 4e^{3x}) dx$ ii) $\int (4e^{3x} + 1) dx$

12. Integrate the function $\cos^2 x$ x [10 x 2 = 20]

PART- B

(Answer any 6 questions. Each question carries 5 marks.)

13. Find the derivative of $f(x) = (3x^2 - 1)(x^2 + 5x + 2)$

14. Find the derivative of i) $f(x) = \frac{x^2+1}{x^3-3x}$ ii) $f(x) = \frac{e^x}{x^2}$

15. Let $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$, $C = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$

Find i) AB ii) 3A-C iii) BA

16. Find X, if $Y = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ and $2X + Y = \begin{bmatrix} 1 & 0 \\ -3 & 2 \end{bmatrix}$

17. If $A^T = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ $B = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$. Verify i) $(A + B)^T = A^T + B^T$

ii) $(A - B)^T = A^T - B^T$

18. Draw the less than ogive

Weights	10-19	20-29	30-39	40-49	50-59
Frequency	7	15	34	18	8

19. Calculate the Mode

Age	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of persons	40	50	70	90	22	65	80	30

20. Find i) $\int \sin 2x \cos 3x dx$ ii) $\int x \sqrt{1 + 2x^2} dx$

21. Find $\int \frac{3x-2}{(x+1)^2(x+3)} dx$ [6x5=30]

PART - C

(Answer any 2 questions. Each question carries 15 marks)

22. Express $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ as the sum of symmetric and skew symmetric matrix.

23. Evaluate i) $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$ ii) $\int x^2 \log x dx$

24. Integrate $\int_0^{\frac{\pi}{2}} \sqrt{\sin \phi} \cos^5 \phi d\phi$

25. Calculate the mean by shortcut method[2x15=30]

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	7	15	25	20	15	8	5

B.Voc. DEGREE MODELQUESTIONS

First Semester

BOVS 102-FOOD CHEMISTRY

Time: 3 Hrs.

Maximum Marks: 80

Part A (Short note Answer Questions)

Answer *Any ten* Questions.

Each Question Carries 2 Marks

1. Distinguish between free water and bound water
2. Define water activity
3. Define epimers and name two epimers of glucose
4. Explain mutarotation of glucose
5. Explain inversion of sucrose
6. Discuss on peptide bond
7. Explain the biuret test of proteins
8. Define enzymes and give any two examples
9. Distinguish between apoenzyme and holoenzyme
10. Explain competitive inhibition
11. Distinguish between fats and oils
12. Define essential fatty acids

(2x10 = 20)

Part B (Descriptive type Answer Questions)

Answer *Any six* Questions

Each Question Carries 5 Marks

13. Distinguish between reducing and non reducing sugar

14. Explain the biological role of protein
15. Discuss on gelatinisation of starch
16. Discuss on denaturation of protein and agents causing it
17. Describe the classification of enzymes
18. Discuss any five applications of enzymes in food industry
19. Explain the mechanism of autooxidation of fat
20. Distinguish between rancidity and reversion
21. Explain hydrogenation of fat

(5x6 = 30)

Part C (Essay Type Questions)

Answer *Any Two* Questions.

Each Question Carries **15 Marks**.

22. Explain in detail about the classification of carbohydrates with examples
23. Explain the structure of protein
24. Formulate the Michael's Menten equation for enzyme kinetics and explain the factors affecting it
25. Explain the technology of oil and fat processing

SECOND SEMESTER MODEL QUESTION PAPERS

Paper Code BOCG201-WRITING AND PRESENTATION SKILLS IN ENGLISH

Part A

Answer *any 10* questions. Each question carries 2 marks.

1. What is a resume?
2. What is a group discussion?
3. What is a project report
4. What is proxemics?
5. What is a letter of enquiry?
6. What is a flip chart?
7. What is a seminar?
8. What is a power of attorney?
9. What is netiquette?

10. What are narrative essays?
11. What are the components of a typical seminar paper?
12. What is para language?

Part B

Answer *any 6* questions. Each question carries 5 marks.

13. What are the important points to be considered while sending collection letters?
14. What is a channel of communication? What are the different types of channel of communication?
15. Write a letter to the editor about the street dog menace in your city.
16. You want to sell your book collection. Prepare a notice to be put up in the college notice board.
17. Write a short note on Kinesics.
18. Prepare an agenda for the monthly board meeting of your firm.
19. What are the points to be remembered while filling an application form?
20. You are the owner of a supermarket. Write a letter inviting quotations from a wholesale dealer.
21. Write a short note on visual aids that are often used in presentations.

Part C

Answer *any 2* questions. Each question carries 15 marks.

22. You are Ravi/Jaya. Prepare an application letter and a resume for the post of an assistant engineer.
23. Write an essay arguing for or against single sex educational institutions.
24. What are the barriers to effective communication? How can we overcome them?
25. Write a descriptive essay about your favorite place.

B.Voc. DEGREE MODELQUESTIONS

Second semester

BOVG 201 - BASIC ORGANIC CHEMISTRY

Time: **3 Hrs**

Maximum Marks: **80**

Section A

(Short note Answer Questions)

Answer *Any ten* Questions.

Each Question Carries **2 Mark**.

(2 X 10 = 20)

1. Sketch the shapes of the most stable configuration of cyclohexane.
2. Distinguish between conformations and configurations.
3. Explain the terms D and L configurations, in the case of optically active carbohydrates.
4. Sketch the important conformation of n-butane.
5. What are the differences between S_N^1 and S_N^2 reactions?
6. What is hyperconjugation? How can this explain the stability of alkenes?
7. Which is more acidic, acetic acid or trichloro acetic acid? Why?
8. What is Saytzeff's rule? Illustrate with an example.
9. What is mesomeric effect? Explain with one example.
10. Predict the major product of the reaction between $CH_3CH=CH_2$ and HI. Outline the principle involved in it.
11. How is phenol-formaldehyde resin prepared?
12. What do you mean by green house effect?

Section B

(Descriptive type Answer Questions)

Answer *Any six* Questions

Each Question Carries **5 Mark**

(5 X 6 = 30)

13. Describe the E and Z nomenclature of geometrical isomers.
14. Explain about ozone depletion.

15. How many stereoisomers are possible for tartaric acid? Draw their structures.
16. State and explain Markownikoff's rule. What is its electronic interpretation?
17. What are E₁ and E₂ reactions. Explain.
18. Draw the Newman projection for the different conformations possible for n-butane. Give the conformational analysis of n-butane.
19. Discuss the term addition polymerization and condensation polymerization with examples.
20. Explain Huckel's rule for aromaticity with an example.
21. Give preparation(any one method), properties, structure and aromaticity of furan.

Section C

(Essay Type Questions)

Answer *Any Two* Questions.

Each Question Carries **15 Marks**.

(2 X 15 = 30)

22. Give notes on water parameters: DO, BOD and COD.
23. Write notes on:
 - (a) Enantiomers and Diastereomers
 - (b) Racemic modifications
 - (c) Meso form and dl form
 - (d) Resolution
24. Discuss the formation, structure and stability of carbocations, carbanions and free radicals.
25. Give the preparation(any one method), properties, structure and aromaticity of pyridine, indole, and pyrimidine

Model Question Paper

BOVG 202 - NUTRITIONAL BIOCHEMISTRY

Maximum Marks: 80

Time: 3 Hrs

Part A

Answer *any ten* questions Each question carries *2 Marks*

1. What are carbohydrates?
2. What are monosachrides?
3. Write the structure of glucose
4. What is the importance of lactose?
5. What are glycosidic bonds?
6. What are amino acids?
7. What is a peptide bond?
8. What are fatty acids?
9. Define vitamins.
10. Name two examples of fat soluble vitamins.
11. What is PER?
12. What is BMR?

(10 x 2 =20)

Part B

Answer *any Six* questions Each question carries *5 Marks*

13. Write the exogenous pathway.
14. Comment on lipoproteins.
15. What is Marasmus. Write the physiological consequences.
16. What are the deficiency symptoms of Vitamin D?
17. Write a note on the digestion and absorption of lipids.
18. Write a note on the digestion and absorption of carbohydrates.
19. Explain the biological functions of proteins.
20. Write a note on Cell and its inclusions.
21. Comment on transcription of DNA

(6 x 5 =30)

Part C

Answer *any two* questions Each question carries *15 Marks*

22. Write a note on oxidative phosphorylation.
23. Describe TCA cycle along with its regulation.
24. Write a note on absorption of lipids.
25. Write a note on translation of RNA in prokaryotes.

(2 x 15 =30)

B.VOC DEGREE MODEL QUESTIONS
Second Semester
BOVS 201 - FOOD PRESERVATION

Time : 3 hours

Maximum: **80** marks

PART A

Answer *any 10* questions.
Each question carries *2 marks*

1. Define pasteurization?
2. Define the term water activity
3. Define blanching?
4. What are the principles of food preservation?
5. What is aflatoxin
6. What is FDV?
7. Write about canning.
8. Write about D value.
9. Write a note on freezer burn.
10. Write a note on eutectic point.
11. Define dehydrofreezing.
12. How does aseptics help in preventing food spoilage? (10x2= 20)

PART B

Answer *any six* questions.
Each one carries *5 marks*

13. Freezing rate is a factor in determining a quality of a frozen food. Elaborate.
14. Explain in detail about Class II preservatives.
15. Differentiate freezer burn and chilling injury. Also explain the methods to prevent them
16. Write about the principle of microwave heating.
17. Write in detail about freeze drying.
18. Write about the quality of frozen foods .
19. Write about ohmic heating
20. Write about the components in refrigerator.
21. Write about hurdle technology. (6 x 5 =30)

PART C

Answer *any two* questions.
Each one carries **15 marks**

22. Explain about the types of fermentation .

23. Explain about dose and applications of irradiation technology.
24. Write about principles and equipments used for dehydration?
25. Write about HPP Technology.

(15x2 =30)

B.Voc. DEGREE MODEL QUESTIONS

BOVS 202 - DAIRY TECHNOLOGY

Time: **3 Hrs.**
Marks: **80**

Maximum

Part A (Short note Answer Questions)

Answer *Any ten* Questions.
Each Question Carries **2 Mark**.

1. Define milk
2. Detail about Food & Nutritive value of milk
3. Explain grading operations in milk
4. Write a short note on Homogenization
5. What is renneting in cheese?
6. Write down the flow chart for the method of manufacture of WMP & SMP
7. Write a note on lactose crystallization in condensed milk
8. Write a note COB test
9. Differentiate between Shrikhand and Paneer
10. Define standardized milk and homogenized milk
11. Write down the flow chart for the processing of curd
12. Write a note on alkaline phosphatase test

(2 X
10 = 20)

Part B (Descriptive type Answer Questions)

Answer *Any six* Questions
Each Question Carries **Mark**

13. Write a note on different types of pasteurization
14. Explain the process of cheddaring
15. Explain theories of churning
16. Explain the role of constituents in icecream
17. Write a note on CIP procedures in a dairy plant
18. Write note on hardening and freezing of ice-cream
19. Explain the physico-chemical properties of milk
20. Discuss on the major quality control tests done for milk
21. Write down the processing of Acidophilus milk

(5 X6 = 30)

Part C (Essay Type Questions)

Answer *Any Two* Questions.

Each Question Carries **15 Marks**.

22. Explain physical, chemical, microbiological and organoleptic methods for the quality control of milk
23. Write the method for the manufacture of homogenized toned milk
24. Write down the method for the manufacture of ice-cream
25. Write down the processing of the following Indian dairy products

Dahi 2. Srikhand 3. Panir 4. Chhana