

NUTRACEUTICAL AND FOOD PROCESSING

Syllabus of the theory papers

BiSEP1: Nutraceuticals

Total hours:52
4Hours

Unit I

Introduction to Nutraceutical

Organizational elements, classification of nutraceuticals, dietary supplements, fortified foods, functional foods and phytonutracuticals. Scope involved in the industry, Indian and global scenario.

Unit II

6Hours

Concept, Biochemistry of nutrition and dietetics

Classification of food components based on nutritional value, nutritional assessment of carbohydrates, proteins and fats, recommended dietary intake, acceptable dietary intake, nitrogen balance, protein efficiency ratio, net protein utilisation. Basics of energy balance - Basal Metabolic Rate (BMR), Body Mass Index (BMI) and Standard Dynamic Action (SDA) with special reference to nutraceutical industry.

Unit III

8Hours

Nutrition related diseases and disorders

Carbohydrates, Protein, amino acids, Fat, vitamins and minerals - Excess and deficiency, symptoms, prevention and management. Role of nutraceuticals with special reference to diabetes mellitus, hypertension, hypercholesterolemia, cancer, glands in the prevention and treatment. Concept of antioxidants - use of antioxidants as dietary supplements in prevention and treatment of cancer, obesity and stress. Role of nutraceuticals and functional foods in pediatrics, geriatrics, sports, pregnancy and lactation.

Unit IV

10Hours

Nutraceuticals of plant and animal origin

Plant secondary metabolites, classification and sub-classification - Alkaloids, phenols, Terpenoids. Extraction and purification, applications with specific examples with reference to skin, hair, eye, bone, muscle, heart, brain, liver, kidney, general health and stimulants. Concept of cosmoceuticals and aquaceuticals.

Animal metabolites - Sources and extraction of nutraceuticals of animal origin. Examples: chitin, chitosan, glucosamine, chondroitin sulphate and other polysaccharides of animal origin, uses and applications in preventive medicine and treatment.

Unit V

8Hours

Microbial and algal nutraceuticals

Concept of prebiotics and probiotics - principle, mechanism, production and technology involved, applications - examples of bacteria used as probiotics, use of prebiotics in maintaining the useful microflora - extraction from plant sources. Synbiotics for maintaining

good health. Algae as source of omega - 3 fatty acids, antioxidants and minerals - extraction and enrichment.

Unit VI

8Hours

Biotechnology in Phytonutraceuticals

Role of medicinal and aromatic plants in nutraceutical industry – propagation - conventional and tissue culture, cultivation, post harvest technology and strategies for crop improvement, development of high yielding lines and yield enhancement, plant genomics and metabolomics. Introduction to nanobiotechnology with special reference to nutraceuticals. Biofortification and nutritional enhancement. GM foods with enhanced nutraceutical properties. Golden rice, GM Tomatoes.

Unit VII

8Hours

Product development and clinical trials

Activity screening, formulations of energy drinks, bars, sports drinks, fortified products, geriatric products, veterinary products, immune boosters, bioavailability, bioequivalence; use of animal models and pre-clinical and clinical trials. Basic Principles of toxicology – oral toxicity, sub-acute, acute toxicity and chronic toxicity. Toxic dose, toxic-kinetics, LD50, dose-response relationships, local v/s systemic toxicity, antagonism and synergism.

References:

1. Israel Goldberg (Ed.) (1999) Functional foods, designer foods, pharma foods, Nutraceuticals, Aspen publishers Inc., USA
2. L. Rapport and B. Lockwood (2002) Nutraceuticals, 2nd Edition, Pharmaceutical Press.
3. M. Maffei (Ed.) (2003) Dietary Supplements of Plant Origin, Taylor & Francis
4. Shahidi and Weerasinghe (Ed.) (2004) Nutraceutical beverages Chemistry, Nutrition and health Effects, , American Chemical Society
5. Richard Neeser & J. Bruce German (2004) Bioprocesses and Biotechnology for Functional Foods and Nutraceuticals, Jean, Marcel Dekker, Inc.
6. Timothy S. Tracy, Richard L. Kingston (1995) Herbal Products
7. Young, J. (1996) Functional Foods: Strategies for successful product development. FT Management Report Pearson Professional Publishers, London.
8. Frei, B. (1994) Natural antioxidants in human health & disease. Academic Press
9. San Diego, Tannock, G.W. (1999) Probiotics: A critical review, Horizon Scientific Press, UK.
10. H. Panda, Herbal beauty products with formulation & processes
11. H. Panda, Herbal Drugs & its plant Sources
12. Herbal Drugs: Potential Antimalarial Herbal Drugs from South Asia-CCRUM.
13. Herbal Medicine & Botanical Medical Fads-Frank Hoffmann, Martin Manning.

BISEP2:FOOD CHEMISTRY

Total Hours:52

Unit I

6 HOURS

Water

Structure, Water content in foods, physical properties, Hydrogen bonding, Types of water in foods, Water activity- Water activity and food spoilage and water activity and packaging. Interaction of water with food components, moisture determination.

Unit II

10 HOURS

Carbohydrates

Definition, nomenclature and classification; physical and chemical properties of sugar; Modified starch, starch hydrolysates, polyols, glycogen, fibre, gums. Artificial and non-nutritive sweeteners. Effect of cooking on carbohydrates.

Unit III

10 HOURS

Lipids and Fats

Classification, fatty acid chemistry, physical chemistry, fat constant – saponification number, acid number, iodine number, acetyl number, Reichert Meissel number, effect of freezing, flavor reversion, oxidative and hydrolytic rancidity, hydrogenation, inter-esterification, application in food processing, food emulsions and fat replacers.

Unit IV

10 HOURS

Proteins

Physical and chemical properties of amino acids, proteins, classification and structure, function and properties of protein, animal and plant proteins, effect of processing. Enzymes employed in food industry.

Unit V

8 HOURS

Vitamins and Minerals

Classification; minerals in meat, milk, plants and their interactions with other components; Losses during processing; Vitamins – classification, sources and effect of food processing.

Unit VI

8 HOURS

Food additives

Flavors and aromas, additives and anti-oxidants, preservatives, anticaking agents, bulking agents, food colorants, emulsifiers, stabilizers, gelling agents, thickeners, humectants

References:

1. Nutraceutical beverages Chemistry, Nutrition and health Effects, Shahidi and Weerasinghe (Ed.), American Chemical Society, 2004.
2. Handbook of Analytical Techniques Vol. I, Gunzler and Williams, Wiley-VCH,2002.
3. Quality Management in Nutraceuticals, Chi Tang Ho n&Quan Yi Zheng (Ed.), American Chem. Soc. 2002.
4. Mahindru, S.N.(2000) Food Additives- Characteristics – Detection and Estimation Tata McGraw Hill Publishing Co. Ltd.
5. Borwankar, R.P. and Shoemaker, C.E. (1992) Rheology of Foods, Elsevier Science Publishers Ltd., England
6. Charalambour, G. (1990) Flavours and Off-Flavours, Elsevier Science Publishers Ltd., The Netherlands.
7. Salunke, D.K. and Kodam, S.S. (2001) Handbook of Vegetable Science and Technology, Marcel Dekker, Inc., New York 5. Cherry, J.P. (Ed) (1981) Protein Functionality in Foods, American Chemical Society, Washington
8. Pomeranz, Y. (Ed) (1991) Functional Properties of Food Components, 2nd edition, Academic Press, New York
9. Duckworth, R.B. (Ed) (1978)Water Relation to Foods, Academic Press, London
10. Bowers, J. (1992) Food Chemistry Food Theory and Applications, 2nd edition, MacMillan Publishing Co., New York
11. Peckham, G. and Freeland, Graves, G.H. (1979) Foundations of Food Preparation
12. Damodaran, S. and Parot, A (1997)Food Proteins and their Applications, Marcel Dekker Inc.
- 13.

BISEP3: FOOD PROCESSING

Total Hours:52

Unit I

4 HOURS

Introduction to food processing industry

Introduction and scope of food processing industry – Indian scenario; Opportunities and domains of food processing sectors; Skills required in the different sectors: Dairy, Vegetable, Fruits, Beverages, Spices processing sectors; Government policies: FICSI.
Comparative analysis of food processing sector in India and Europe.

Unit II

16 HOURS

Principles and Technologies in Food Processing

Unit operations in food processing: raw material preparation, cleaning, sorting, grading and peeling; Food conversion operations: size reduction and screening, mixing, emulsification, filtration, membrane separation, centrifugation, extraction and crystallization;
Processing by application of heat –
Heat processing using steam or water: Blanching, Pasteurization, Heat Sterilization, Evaporation, Distillation, Extrusion and Canning;
Heat processing using hot air: Dehydration, Intermediate Moisture Foods, Baking and Roasting, Heat processing using hot oils: Frying.
Processing by chemical methods: by sugar, salt, curing, smoking, acid and chemicals;
Processing by removal of heat: Chilling, Freezing, Freeze-drying and Freeze concentration; Irradiation of foods.

Unit III.

12 HOURS

Food and Allied Industries

Cereal Technology: Rice- Parboiling and milling methods, by products of rice milling and their utilization. Wheat- Milling, Byproducts of milling;
Millets Technology- major and minor millets- Processing Pulse Technology- Types, processing and methods to remove toxic factors;
Fruits and vegetables-Processing – Drying and dehydration techniques, canning and freezing;
Dairy Technology- Milk processing- separation, standardization, pasteurization, homogenization, sterilization- Ultra High Temperature (UHT), Sterile milk and milk products, butter, cream and ghee;
Oil seed Technology- Extraction of oils, meal concentrates and isolates.
Spice technology- Processing, Extraction of essential oils and colors;
Confectionary technology- types of confectionaries and its method of preparation.

Unit IV

8 HOURS

Food Preservation

Aspects of microbiological safety in food preservation technologies, Establishment and implementation of HACCP, Continuous Assessment System, Total quality management and quality audits in food industries

Unit V**8 HOURS****Packaging**

Principles of packaging; Types of packaging; Special packaging: Vacuum, gas and shrinkage packaging; Function of packaging; Packaging materials: structural qualities, performance, moisture and gas transmission; Interaction between food and packaging material; Shelf life testing.

Unit VI**4 HOURS****Labelling**

Functions of labeling; Laws and regulations; Mandatory label elements: Statement of identity, statement of net contents, statement of ingredients, name and place of business of the manufacturer, packager or distributor; Food allergen labeling: the big eight gluten free; Nutrition labeling; Claims of labels; Use of “fresh”, “natural”, “organic” indications; GMO food labeling guidance; Labeling for nutraceuticals, functional foods, and pediatric food.

References:

1. P.J.Fellows, Food Processing Technology. Principles and Practices, Second Edition, Woodland Publishing Ltd, Cambridge, England, 2002.
2. Avantina Sharma, Text Book of Food Science and Technology, International Book Distributing Co, Lucknow, UP, 2006.
3. Sivasankar, Food Processing and Preservation, Prentice hall of India Pvt Ltd, New Delhi. IIIrd Printing, 2005.
4. Peter Zeuthen and Leif Bogh-Sorenson, Food Preservation Techniques, Woodland Publishing Ltd, Cambridge, England, 2005.
5. Hirasu, K and Takemasa, M. (1998), Spice Science and Technology, Lion Corporation, Tokyo, Japan
6. Kalp, K. Lorenz, K. and Brummer, J. (1995) Frozen and Refrigerated Doughs and Batters, American Association of Cereal Chemists INC. St. Paul, Minnesota.
7. Von Loesecke, H.W. (1998) Food Technology Series: Drying and Dehydration of Foods, Allied Scientific Publishers
8. Matz, S.A. (1996), Bakery Technology & Engineering, 3rd Edition, CBS Publishers, New Delhi.
9. Fellows, P.J. (2000), Food Processing Technology: Principles and Practice, 2nd Edition, CRC Woodhead Publishing Ltd, Cambridge.
10. Hosney, R.C. (1996) Principles of Cereal science and Technology, 2nd Edition, American Association of Cereal Chemists, St. Paul, Minnesota.
11. Salunkhe, D.K. and S.S. Kadam (1995), Handbook of Fruit Science and Technology: Production, Composition, Storage and Processing, Marcel Dekker INC. New York
12. Askar, A., Freptor, H. (1993) Quality Assurance in Tropical Fruit Processing, Springer Verlag, Berlin
13. Oliveira, A.R., Oliveira, J.C. (1999) Processing Foods Quality Optimization and Process Assessment, CRC Press, Boca Raton.
14. Peter Fellows (ed) (1997) Traditional Foods: processing for Profit, Intermediate Technology Publications, London.

BiSEP4: Syllabus of the Elective theory papers

(Choose any one from the following)

BiSEP4a : PRODUCT DEVELOPMENT

Unit I

12 HOURS

Essentials of product development

Company protocols for research, privacy policies, institutional and professional code of ethics and standards of practice, IPR guidelines, Knowledge of basic laboratory procedures, GLP and GMP, relevant EOPs, SOPs, process flows in manufacturing, product life cycle and product properties, competitor products. Stability studies – generate stability data & prepare stability reports for innovation products.

Unit II

10 HOURS

Reporting and documentation

Reporting – different standard reference materials used like drugs, products, side effects, adverse reactions, process details, statistical analysis of test data. Documentation – methods and procedures of writing and maintaining lab, research records, research performance reports, schemes and guidelines, power point presentations, tables, charts, word documents, development of research objectives and proposal writing for funding and contractual purposes, publications and technical writing, Regulatory compliance of the final documents.

Unit III

8 HOURS

Planning and communication

Research planning – resource, time, timeline & budget considerations, technical feasibility analysis on the NPD ideas by analyzing current development plans, plan day to day activities. Research communications - preparation of progress reports/ research outcomes for steering groups/ bodies, principal investigator, communication with upstream and downstream teams

Unit IV

6 HOURS

Problem solving and decision making

Research initiatives – use new areas of research, techniques and methods, extend research/ product portfolio, creative analysis & interpretation of research data. Decision making – collaborative, appropriate, optimum & best possible solution, Trouble- shoot & Resolve problems to avoid delays .

Unit V

8 HOURS

Safety and Security at workplace

Different types of occupational health hazards, knowledge of chemical substances, characteristics & safety measures, use of safety gears, masks, gloves & accessories, evacuation procedures for workers & visitors. Health, safety & security issues – types (illness, fire accidents), company policies and procedures, When and how to report, summon medical assistance & emergency services.

Unit VI

8 HOURS

Interpersonal Skills

Understand work output requirements, company rules, guidelines & policies related to the process flow, identifying and reporting issues requiring intervention, delivery of quality work on time & report any anticipated reasons for the delay, effective interpersonal communication, conflict-resolution techniques, importance of collaborative working, multi-tasking, training the team members, knowledge of project management.

References

1. Endrenyi, L., Declerck, D. and Chow, S. (2017). Biosimilar Drug Product Development. Boca Raton: CRC Press.
 2. Improving New Product Development: Bausch. (2004). [Place of publication not identified]: American Productivity & Quality Center (APQC).
 3. Jain, N. (2011). Pharmaceutical product development. New Delhi: CBS Publishers.
 4. Jameel, F., Hershenson, S., Khan, M. and Martin-Moe, S. (n.d.). Quality by design for biopharmaceutical drug product development.
 5. Kanfer, I. and Shargel, L. (2010). Generic drug product development. New York: Informa Healthcare.
 6. Reklaitis, G., García-Munoz, S. and Seymour, C. (n.d.). Comprehensive quality by design for pharmaceutical product development and manufacture.
 7. Shargel, L. and Kanfer, I. (2010). Generic drug product development. New York: Informa Healthcare USA.
 8. Abraham, J. and Lawton Smith, H. (2003). Regulation of the pharmaceutical industry. Houndmills, Basingstoke, Hampshire: Palgrave Macmillan.
 9. Haider, S. (2002). Validation standard operating procedures. Boca Raton [Fla.]: St. Lucie Press.
 10. Haider, S. and Asif, E. (2011). Quality control training manual. Boca Raton: CRC Press.
 11. Jameel, F., Hershenson, S., Khan, M. and Martin-Moe, S. (n.d.). Quality by design for biopharmaceutical drug product development.
 12. Krattiger, A., Mahoney, R., Nelsen, L., Thomson, J., Bennett, A., Satyanarayana, K., Graff, G., Fernandez, C. and Kowalski, S. (2007). Intellectual property management in health and agriculture innovation. Oxford, U.K.: MIHR.
 13. Guirdham, M. (1990). Interpersonal skills at work. New York: Prentice-Hall.
 14. Jameel, F., Hershenson, S., Khan, M. and Martin-Moe, S. (n.d.). Quality by design for biopharmaceutical drug product development.
 15. Krattiger, A., Mahoney, R., Nelsen, L., Thomson, J., Bennett, A., Satyanarayana, K., Graff, G., Fernandez, C. and Kowalski, S. (2007). Intellectual property management in health and agriculture innovation. Oxford, U.K.: MIHR.
 16. Robbins, S. (1989). Training in interpersonal skills. Englewood Cliffs, NJ [u.a.]: Prentice Hall.
 17. Hofmann, A. (n.d.). Scientific writing and communication.
 18. Lynch, M. and Woolgar, S. (1990). Representation in scientific practice. Cambridge, Mass: MIT Press.
- Cronin, B. (1984). The citation process. London

BiSEP4b: QUALITY CONTROL/QUALITY ASSURANCE

Unit I

10 HOURS

Essentials of quality control

Preparations - buffer, solvents, solutions and microbial media for running bio-analytical quality tests, assays to carry out quality control procedures on biopharmaceutical products. Concepts of pharmacopeia like BP, USP, EP and other applicable guidelines such as WHO, ICH and EMEA, etc., statistical tools and software like combistats, safe handling of infectious materials like cultures, strains and seed strains, procedures for handling infectious spillage control, GLP/GMP, biochemical analysis of proteins, bio analytical and microbiological methods, working of instruments/apparatus/equipment, biological assays, application of various analytical techniques such as HPLC, capillary electrophoresis including icIEF, FTIR, Circular Dichroism, UV and Fluorescence spectroscopy, ELISAs, enzyme assays and other applicable methods for the testing of biopharmaceuticals, application of microbiological techniques such as air monitoring, water testing, surface monitoring, microbial monitoring, biosafety levels and biosafety hazards .

Unit II

8 HOURS

Quality Assurance

Quality checks - quality assurance samples, master sample, internal controls, statistical analysis of test data, techniques and concepts of statistical quality control and statistical process control, non-conformities. Operational aspects – calibration, accuracy checks of quality control equipments like stability chambers and BOD incubators, HPLC, gas chromatography, photofluorometer, etc., application softwares used in quality analysis.

Unit III

6 HOURS

Safety and Security at workplace

Different types of occupational health hazards, knowledge of chemical substances, characteristics & safety measures, use of safety gears, masks, gloves & accessories, evacuation procedures for workers & visitors. Health, safety & security issues – types (illness, fire accidents), company policies and procedures, When and how to report, summon medical assistance & emergency services.

Unit IV

6 HOURS

Interpersonal Skills

Understand work output requirements, company rules, guidelines & policies related to the process flow, identifying and reporting issues requiring intervention, delivery of quality work on time & report any anticipated reasons for the delay, importance of team work, resolution of conflicts, multi-tasking, training the team members, knowledge of project management.

Unit V

6 HOURS

Clean work station

Cleaning the work area and equipments, materials and equipments required for cleaning, adequate ventilation for the work area, personal protective equipments, dealing with

accidental damage, procuring and storing housekeeping equipment and supplies, disposal of wastes, maintain schedules and records for housekeeping.

Unit VI

8 HOURS

Reporting and documentation in quality

Reporting – company procedures, escalation matrix for reporting identified issues - defects, problem, incidents, quality issues and test results, feedback to production manager and R&D staff. Documentation – procedures and good documentation practices, offline and online mode, accuracy, details, controlled document files and test records, regulatory and compliance requirements, inspection - procedures, protocols and checklists, inspection reports.

Unit VII

8 HOURS

Introduction; Food laws in India: Drugs and Cosmetics Act, 1945; Agmark; Food adulteration act, 1954; Fruit Products Order, 1955; Meat Food Products order, 1973; Vegetable oil products (control) order, 1947; Edible oils packaging (regulation) order, 1988; Milk and milk products order, 1992; FSS Act, 2006; FSSAI: roles and responsibilities. Codex alimentarius. Concept of HACCP - Hazard assessment, ISO 22000 regulations - implementation in food, dairy, poultry, meat and meat products industry. Introduction to food safety and security, Food contaminants: microbial, chemical and physical; Food adulteration; sanitation in warehousing, storage, and shipping; Control of rats, rodents, mice, birds, insects and microbes.

References

1. Anjaneyulu, Y. and Marayya, R. (2005). Quality assurance and quality management in pharmaceutical industry. Hyderabad, A.P.: Pharma Book Syndicate.
2. Jameel, F., Hershenson, S., Khan, M. and Martin-Moe, S. (n.d.). Quality by design for biopharmaceutical drug product development.
3. Reklaitis, G., García-Munoz, S. and Seymour, C. (n.d.). Comprehensive quality by design for pharmaceutical product development and manufacture.
4. Abraham, J. and Lawton Smith, H. (2003). Regulation of the pharmaceutical industry. Houndmills, Basingstoke, Hampshire: Palgrave Macmillan.
5. Haider, S. (2002). Validation standard operating procedures. Boca Raton [Fla.]: St. Lucie Press.
6. Haider, S. and Asif, E. (2011). Quality control training manual. Boca Raton: CRC Press.
7. Jameel, F., Hershenson, S., Khan, M. and Martin-Moe, S. (n.d.). Quality by design for biopharmaceutical drug product development.
8. Krattiger, A., Mahoney, R., Nelsen, L., Thomson, J., Bennett, A., Satyanarayana, K., Graff, G., Fernandez, C. and Kowalski, S. (2007). Intellectual property management in health and agriculture innovation. Oxford, U.K.: MIHR.
9. Guirdham, M. (1990). Interpersonal skills at work. New York: Prentice-Hall.
10. Jameel, F., Hershenson, S., Khan, M. and Martin-Moe, S. (n.d.). Quality by design for biopharmaceutical drug product development.

11. Krattiger, A., Mahoney, R., Nelsen, L., Thomson, J., Bennett, A., Satyanarayana, K., Graff, G., Fernandez, C. and Kowalski, S. (2007). Intellectual property management in health and agriculture innovation. Oxford, U.K.: MIHR.
12. Robbins, S. (1989). Training in interpersonal skills. Englewood Cliffs, NJ [u.a.]: Prentice Hall.
13. Hofmann, A. (n.d.). Scientific writing and communication.
14. Lynch, M. and Woolgar, S. (1990). Representation in scientific practice. Cambridge, Mass: MIT Press.
15. Cronin, B. (1984). The citation process. London.
Haider, S. and Asif, E. (2011). Quality control training manual. Boca Raton: CRC Press.

Syllabus of the practical papers

BiSEP 5: Nutraceuticals and Food processing (LAB)

1. Principle and practice of various extraction procedures used in herbal industry.
2. Phytochemical profiling of plant sample and extract.
3. Extraction and quantification of alkaloids.
4. Extraction and quantification of polyphenols.
5. Extraction and quantification of flavonoids.
6. Extraction and quantification of saponins.
7. Isolation and purification of colors.
8. Extraction of chitin, chitosan and glucosamine from prawn shells/mushrooms.
9. Lab-scale production of probiotics.
10. Preparation of jam, juice and squash.
11. Preparation of wine from grapes.
12. Formulation of a health drink.
13. Processing of milk and milk based products – pasteurization, paneer, ghee, cheese and butter.
14. Canning of vegetables and fruits.
15. Technologies for processing of fruits and vegetables.
16. Industry visit to a food processing and nutraceutical unit.

BiSEP 6 :Lab2 : Quality Control and analytical techniques (LAB)

1. Handling of analytical equipment (Colorimeter, Kftitrator, Halogen moisture balance, HPLC, Uvvisible spectrophotometer).
2. Writing of Standard operating procedures (SOPs).
3. Writing of GLPs and GMPs with respect to food and nutraceutical industry – a case study.
4. Sensory evaluation tests for processed foods.
5. Determination of the quality of an egg (whole and open egg).
6. Determination of the moisture content of various food and nutraceutical samples.
7. Determination of viscosity of various food gruels (porridge, custards, batters etc) using viscometer.
8. Detection of pathogens in food using biochemical analysis.
9. Detection of microbial load in processed food and nutraceutical sample.
10. Estimation of a) Iodine value, (b) Saponification value (c) acid value of fats and oils.
11. Qualitative identification of adulteration in dairy products.
12. Determination of heavy metal load and pesticide residues in food and nutraceutical samples.
13. Qualitative analysis of wheat flour.
14. Analysis of non-alcoholic beverages for caffeine content.
15. Nutritional profiling of food samples for labeling.
16. Preparation of certificate of analysis of nutraceutical raw material – turmeric and curcumin.
17. Preparation of certificate of analysis of lactobacillus.
18. Preparation of certificate of analysis of processed food.
19. Visit to GMP/GLP complying industry or lab.