KanyaMahaVidyalaya
Jalandhar City

(An Autonomous College)

KANYA MAHA VIDYALAYA, JALANDHAR
(UGC Autonomous College)

KANYA MAHA VIDYALAYA, JALANDHAR
(UGC Autonomous College)
Department of Food Science and Microbiology
Meeting by Circulation
Proceedings of the Meeting of Board of Studies held on 20-05-2021

In the light of current lockdown in the country due to pandemic COVID-19,sixth meeting of the board of studies could not be held in person. The zoom meeting for the same was held on 20-05-2021 at 10:00am. The detailed suggestions/discussions on agenda items reached to Chairperson via email at **foodsciencemicro@ymail.com** by 21-05-2021.

Date: Thursday, 20-05-2021
Time: 10:00 am
Venue: Online meeting at Zoom

Following Members of the Board of Studies attended the meeting:

1.	Mrs. SadhnaTandon, Head of department/Dean of Life Sciences, K.M.V, Jalandhar **(Chairperson)**	Present
2.	Dr. Dalbir Singh Sogi, Professor, G.N.D.U Amritsar **(University Nominee)**	Present
3.	Dr. Charanjiv Singh Saini, Professor, SantLongowal Institute of Engineering and Technology, (Longowal, Distt. Sangrur) **(Outside Parent University Nominee)**	Present
4.	Dr. Kamlesh Prasad, Professor, SantLongowal Institute of Engineering Technology, (Longowal, Distt. Sangrur) **(Outside Parent University Nominee)**	Present

The Chairperson Mrs. SadhnaTandon welcomed the members of Board of Studies. She apprised the members thatduring the COVID-19 pandemic, technologies are playing a crucial role in keeping our society functional. As KMV always keep pace with time so we took all steps for timely completion if syllabus through LMS, Video lectures etc. Students were assessed time to time using these tools and we have been able to monitor them on regular basis.

She took up the agenda items for deliberation one by one with the permission of committee members.

Item:FoodSci& Micro 6:2021:1 To confirm the Proceedings of fifth BOS and Action Taken Report.

The chairperson sent the proceedings of the previous Board of Studies and Action Taken Report meeting held on 24-11-2020 through email to all the members and they approved it through Zoom meeting. **(attached herewith as Annexure A)**

The house approved the Item:FoodSci& Micro 6:2021:1

Item:FoodSci&Micro 6: 2021: 2To discuss the syllabus of Food Science in Bachelor of Science (Medical), Semester(I,II,III, IV,V& VI) under continuous evaluation system for the session 2021-22.

Discussions were made regarding minor rearrangements in the contents, addition of new topics.

Following changes were incorporated in **Food Chemistry and nutrition** paper (Sem I) :-

1. Following topics were suggested to **be Replaced**:

    - **In unit-IV**, it was suggested to replace the topic "Egg" **with the topic** "Egg and poultry" It was suggested to replace the topic "Meat" **with the topic** "Meat and Fish" It was suggested to rearrange the topic "vegetables and fruit" **with the topic** "Fruits and Vegetables."

2. It was suggested to remove the following topics:

    - **In unit –II,** Enzymes- Nomenclature, definition, specificity, catalysis, enzyme kinetics, factors influencing enzyme activity, controlling enzyme action, role of enzymes in food processing, modification of food by endogenous enzyme and enzyme inhibitors in foods.
    - Flavors –Types of flavors.

3. It was suggested to shift the following topics:
    - **In unit-I,**they suggested to shift the following topics from **unit I to unit II:-** "**Carbohydrate**—composition, classification, food sources, storage in body, reaction, structure,functions of mono, oligo and poly-saccharides in foods", "**Fat and oils**—composition, saturated, unsaturated fatty acids, food sources, functions of fats.Nomenclature and classification, emulsions and emulsifiers, role of fat and oil in food processing,"**"Proteins** — composition, essential and non–essential amino acids, sources of protein, functions, protein deficiency diseases, physico–chemical properties, modification of food protein during processing and storage."
    - **In unit-II,** they suggested to shift the topic, "Recommended dietary Requirements- Nutrient requirement for adult men and women as per ICMR"to**unit-I.**

Following changes were incorporated in **Food Processing and Packaging** paper(Sem III)

1. Following topics were suggested to replaced:

- **In unit-I,** the Board suggested to replace the topic,"Chemical preservation in food processing, chemical changes in food that affect the texture, color, flavor, odor, stability

and nutritive quality during processing and storage"with the **Topic "**Chemical preservation in food processing."

- **In unit-III,** it was suggested to replace the topic "Processing of spices and flavor" **with the topic "**Spices and flavors."

2. It was suggested to add the following topic:

- **In unit-II,** they suggested to add the Topic "Enzymes: Definition, factors affecting enzyme activity, role of enzymes in food processing."

3. It was suggested to rearrange and shift the following topic:

- **In unit III,** it was suggested to rearrange **the topic from** Manufacturing process: Extruded foods **to the topic "**Extruded foods**" and** was **shifted from unit III to unit II.**

4. It was suggested to remove the following topic:

- **In unit II,** it was suggested to remove the topic "Quality control in food industry-methods of evaluation and control of the various aspects of quality of raw materials, manufacturing process and the testing of finished products."
- **In unit IV,** it was suggested to remove the following topic, "food and food package interaction."

5. Correction of spelling:

- **In unit-III**,the spelling of bear was corrected to "beer."

6. It was suggested to rearrange following practicals:

    - It was suggested **to rearrange** the practical **from**To determine grease resistance of packaging material**to**To determine the strength of different packaging material.
    - It was suggested **to rearrange** the practical **from**To see the chemical resistance of packaging materials **to**To check the chemical resistance of packaging materials.
    - It was suggested **to rearrange** the practical **from**Adequacy of blanching **to**To check the adequacy of blanching.

Following changes were incorporated in **Quality Assurance** paper (SemIV)

1. It was suggested to add the following topic:
    - **In unit-I,** it was suggested to add the topic, "Quality control in food industry-methods of evaluation and control of the various aspects of quality of raw materials, manufacturing process and the testing of finished products."

Following changes were incorporated in **Food Analysis** paper (SemV)

1. It was suggested to remove the following topic:
    - **In unit-III,** it was suggested to remove the topic, "Polarography."

2. It was suggested to remove the following pracaticals:
    - Lactometric determination
    - Refractrometry
    - Polarimetry and polarography
    - Food Rheology
3. It was suggested to add the following practicals:
    - Determination of milk quality by lactometer
    - To find out the TSS of food sample by refractrometer.
    - Determination of surface tension of food sample by using drop number method.
    - Determination of viscosity index of food sample.

4. It was suggested to rearrange the following practical:
    - It was suggested to rearrange the practical from Proximate composition of food **to** Proximate composition of different types of food.

Following changes were incorporated in **Food plant layout and managment** paper (SemVI)

1. It was suggested to remove the following practical:
    - Determination of BOD/COD.

The needful was done according to the suggestions given.The proposed syllabus has been approved for semester I, II, III, IV, V and VI for session 2021-22. **(Approved syllabus attached herewith as Annexure B.)**

The house approved the Item:FoodSci& Micro 6: 2021: 2 with recommended changes.

Item:FoodSci& Micro 6: 2021: 3 To discuss the syllabus of Microbiology in Bachelor of Science (Medical), Semester I,II,III, IV, V & VI under continuous evaluation system for the session 2021-22.

The proposed syllabus has been approved for semester I,II,III, IV, V and VI for session 2021-22. **(Approved syllabus attached herewith as Annexure C.)**

The house approved the Item:FoodSci& Micro 6: 2021: 3 with recommended changes.

Item:FoodSci& Micro 6: 2021: 4 To discuss and approve list of proposed examiners for above stated courses.Proceedings:

List of Paper setters and evaluators were purposed by Internal committee members and were approved. **(Lists attached herewith as Annexure D)**

The house approved the Item:FoodSci& Micro 6: 2021: 4

Item:FoodSci& Micro 6: 2021: 5To discuss teaching methodologies adopted in department and inputs required to upgrade the same.

- The chairperson explained the house that whole syllabus was covered by the teachers through online classes(e-classes). The Learning Management System (LMS) of college is beneficial for the students for their studies in the pandemic period of Covid-19. All the modules are covered by uploading e-notes on LMS, e-mails and whatsapp. Queries were also solved on WhatsApp groups. Even their Mid semester examination was conducted by on line methods. Our Department is well equipped with instruments, e-content, powerpoint presentations and demonstrations for better understanding of concepts. The department is doing excellent work for hands on training to students by extended practical, projects and online assignments. The activities like Product development of seasonal foods(food stall), workshops, quiz, and industrial visit for overall development of students and to create passion for science are regularly organized. BOS member appreciated the teaching methodologies of department. The students can learn the preparation of various fermented and fortified foods. **(attached herewith as Annexure E)**

  The house approved the Item:FoodSci& Micro 6: 2021: 5

Item:FoodSci& Micro 6: 2021: 6 To discuss the outcome of above stated courses.

Following changes were incorporated in outcomes of **Food Chemistry and Nutrition**paper (Sem I) :-

1. Following outcomes were suggested to be rearrange:

   FROM:

   - **CO1**: Understand food, its functions, food groups, malnutrition and nutrient requirement for adult men and women as per ICMR.
   - **CO2**: Understand the chemistry underlying the properties of various food components.
   - **CO3**: Understand digestion, absorption, transport and utilization of nutrients in the body.
   - **CO4**: Learn about the nomenclature, definition, specificity, catalysis of enzyme, factors influencing enzyme activity and role of enzymes in food processing.
   - **CO5**: Understand the composition and nutritional significance of cereals, milk and milk products, egg, meat, fruits and vegetables.

   TO:

   - **CO1:** Understandfood, its functions,food groups, food digestion, absorption, transport and utilization of nutrients in the body.
   - **CO2:** Understand nutrition, malnutrition and nutrient requirement for adultmen and women as per ICMR.
   - **CO3:** Understand the composition and nutritional significance of cereals, milk and milk products, egg, meat, fruits and vegetables.

- **CO4:**Understand the chemistry underlying the properties of various food components.

Following changes were incorporated in outcomes of Food Processing and Packaging paper (Sem III) :-

1. Following outcomes were suggested to rearrange:

- **CO1:** Understand the reasons of spoilage and basic principles of food preservation methods.
- **CO2:** Understand packaging materials, characteristics and machinery used for packaging food.
- **CO3:** Understand processing of fats, oils, sugar, salt, tea, coffee, chocolate and cocoa powder, spices and flavor andextruded foods.
- **CO4:** Learnmanufacturing offermented products: wine, vinegar, beer, fermented milks, yoghurt, etc.
- **CO5:** Understand techniques that can be used to monitorquality of raw materials,manufacturing process and testing of the finished products.

TO:

- **CO1:** Understand the reasons of spoilage and basic principles of food preservation methods.
- **CO2:** Understand different types of packaging materials, their properties and packaging machinery used in packaging of food.
- **CO3:** Understand processing of fats, oils, sugar, salt, tea, coffee, chocolate and cocoa powder, spices and flavor andextruded foods.
- **CO4:** Learnmanufacturing offermented products: wine, vinegar, beer, fermented milks, yoghurt, etc.

Following changes were incorporated in outcomes of Food Analysis paper (Sem V) :-

- Following outcomes were suggested to rearrange:
- **CO1:** Understand the nutritional importance of food.
- **CO2:** Understand the chemical and biochemical composition of foods and their importance for health, well being and safety of consumers
- **CO3:** Understand physical characteristics of foods with special reference to rheological behavior and textural characteristics.
- **CO4:** Understand the basics of chromatography techniques to separate and identify various biological molecules with special reference to amino acids, carbohydrates, lipids, nucleic acid, and proteins.
- **CO5:** Understand the importance of legal standard, quality assurance, nutritional value determination and adulterants detection.

TO:

- **CO1:** Understand the chemical and biochemical composition & nutritional importance of foods and their importance for health and safety of consumers
- **CO2:** Understand physical characteristics of foods with special reference to rheological behavior and textural characteristics.

- **CO3:** Understand the basics of chromatography techniques to separate and identify various biological molecules with special reference to amino acids, carbohydrates, lipids, nucleic acid, and proteins.
- **CO4:** Understand the importance of legal standard, quality assurance, nutritional value determination and adulterants detection.

The needful was done according to the suggestions given. The proposed outcomes has been approved for semester I,II, III, IV , V & VI for session 2021-22.

Course outcomes of Microbiology of B.Sc. Medical (Semeste, I, II, II,IV, V& VI) for session 2021-22 has been (**approved attached herewith as Annexure B&C.)**

The house approved the Item:FoodSci& Micro 6: 2021: 6 with recommended changes.

Item:FoodSci& Micro 6: 2021: 7 To discuss the course scheme and detailed syllabus for above stated programmes.

Approved syllabus and course scheme of B.Sc Medical (Semester I, II, III, IV,V &VI) is **attached herewith as Annexure B&C.**

The house approved the Item:FoodSci& Micro 6: 2021: 7

The meeting ended with vote of thanks by Mrs. SadhnaTandon. She said that all achievements are due to excellent team work and she has full faith in her team for prospective growth of department under Autonomous status. She also thanked all the external members of Board members for their valuable inputs and for sparing their precious time for the meeting.

FACULTY OF SCIENCES

Syllabus

Of

Microbiology

For

B.Sc. Medical (Semester I – VI)

(12+3 System of Education)

Session: 2021-22

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR (Autonomous)

KanyaMahaVidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATION OF THREE YEAR DEGREE PROGRAM

Bachelor of Science (Medical) Semester-I

(SESSION 2021-22)

Bachelor of Science (Medical) Semester I									
Course Code		**Course name**	**Course Type**	**Marks**					**Examination time (in Hours)**
				Total	**Paper**	**Ext.**		**CA**	
						L	**P**		
BSMM-1343	I	Microbiology	E	100	Fundamentals of Microbiology	60	-	20	3
	P				Practical- Fundamentals of Microbiology	-	20		3

KanyaMahaVidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATION OF THREE YEAR DEGREE PROGRAM

Bachelor of Science (Medical) Semester-II

(SESSION 2021-22)

Bachelor of Science (Medical) Semester II									
Course Code		**Course name**	**Course Type**	**Marks**					**Examination time (in Hours)**
				Total	**Paper**	**Ext.**		**CA**	
						L	**P**		
BSMM -2343	I	Microbiology (Basic Food Microbiology)	E	100	Basic Food Microbiology	60	-	20	3
	P				Practical- Basic Food Microbiology	-	20		3

KanyaMahaVidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATION OF THREE YEAR DEGREE PROGRAM

Bachelor of Science (Medical) Semester-III

(SESSION 2021-22)

Bachelor of Science (Medical) Semester III									
Course Code		**Course name**	**Course Type**	**Marks**					**Examination time (in Hours)**
				Total	**Paper**	**Ext.**		**CA**	
						L	**P**		
BSMM-3343	I	Microbiology	E	100	Microbial Nutrition and Metabolism	60	-	20	3
	P				Practical- Microbial Nutrition and Metabolism	-	20		3

KanyaMahaVidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATION OF THREE YEAR DEGREE PROGRAM

Bachelor of Science (Medical) Semester-IV

(SESSION 2021-22)

Bachelor of Science (Medical) Semester IV									
Course Code		**Course name**	**Course Type**	**Marks**					**Examination time (in Hours)**
				Total	**Paper**	**Ext.**		**CA**	
						L	**P**		
BSMM-4343	I	Microbiology (Microbial Ecology)	E	100	Microbial Ecology	60	-	20	3
	P				Practical-Microbial Ecology	-	20		3

KanyaMahaVidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATION OF THREE YEAR DEGREE PROGRAM

Bachelor of Science (Medical) Semester-V

(SESSION 2021-22)

Bachelor of Science (Medical) Semester V									
Course Code		**Course name**	**Course Type**	**Marks**					**Examination time (in Hours)**
				Total	**Paper**	**Ext.**		**CA**	
						L	**P**		
BSMM-5343	I	Microbiology	E	100	Applied Microbiology – I	60	-	20	3
	P				Practical- Applied Microbiology – I	-	20		3

KanyaMahaVidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATION OF THREE YEAR DEGREE PROGRAM

Bachelor of Science (Medical) Semester-VI

(SESSION 2021-22)

Bachelor of Science (Medical) Semester VI									
Course Code		**Course name**	**Course Type**	**Marks**					**Examination time (in Hours)**
				Total	**Paper**	**Ext.**		**CA**	
						L	**P**		
BSMM-6343	I	Microbiology (Applied Microbiology-II)	E	100	Applied Microbiology-II	60	-	20	3
	P				Practical- Applied Microbiology-II	-	20		3

Bachelor of Science (Medical) Semester–I
Session 2021-22
MICROBIOLOGY
Course Title: FUNDAMENTALS OF MICROBIOLOGY
Course Code: BSMM-1343 (I)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

- **CO1:** Understand the history of microbiology and their characterization and identification.
- **CO2:** Learn the different principlesand applications of microscopy and methods of sterilization,preparation of a culture media, pure culture concept and different staining techniques of bacteria.
- **CO3:** Understand the fine structure of bacterial cell and nutrition and nutritional requirements ofmicroorganisms. Preparation of different types of media and control of microorganisms by physical and chemical agents.
- **CO4:** Understand the reproduction and growth of microorganisms and epidemiology of common bacterial and viral diseases in human.

Bachelor of Science (Medical) Semester–I
Session 2021-22
MICROBIOLOGY
Course Title: FUNDAMENTALS OF MICROBIOLOGY
Course Code: BSMM-1343 (I)
(THEORY)

Examination Time: 3 Hrs.

Max. Marks: 100
Theory Marks: 60
Practical Marks: 20
CA: 20

Instructions for the Paper Setter: Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT–I

1. **Introduction and Scope of Microbiology:** Discovery of microorganisms, history of microbiology, controversy over spontaneous origin or microorganisms, discovery of anaerobic life, germ theory of fermentation as life without oxygen, germ theory of disease.
2. **Characterization and Identification of Microorganisms:** Place of microorganisms inliving world, Hackel's and Whittaker's system of classification, prokaryotic and eukaryotic cells, characteristics of main groups of microorganisms.

UNIT–II

3. **Microscopy:** Principles and applications of Bright field microscopy, Dark field phase contrast, Fluorescence and Immunofluoresence, Electron microscopy.
4. **Methods in Microbiology:** Methods of sterilization, preparation of a culture media, pure culture concept, staining of bacteria such as simple, negative and differential methods. Antibiotics, properties and mode of action: drug resistance and its significance, antibiotic sensitivity test.

UNIT–III

5. **Structure of Bacteria:** Fine structure of bacterial cell, cell wall, cell membrane, capsule, pili, flagella, ribosomes, Cytoplasmic inclusions, Bacterial movement, Endospore and physiology of endospore formation.
6. **Nutrition:** Nutritional requirements of microorganisms, nutritional types of bacteria, autotrophs, heterotrophs, parasites, types of culture media, differential media, selective media and enrichment media. Control of microorganisms by physical and chemical agents.

UNIT–IV

7. **Reproduction and Growth in Microorganisms:** Modes of cell division, growth curve of bacteria, continuous culture, synchronous growth, quantitative measurement of bacterial growth, Effect of various factors on growth of bacteria.
8. **Clinical Microbiology:** Epidemiology reservoirs and modes of transmission of infectious diseases. Pathogenesis, diagnosis and treatment of common bacterial and viral diseases (including COVID 19) in humans.

Books Recommended:

1. Pelczar, M.I., Chan, E.C.S. and Krieg, N.R. 2011, 5th edition, Microbiology. Tata McGraw Hill Publishing Co., Ltd.,New Delhi.
2. Stanier, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. 2005, 5th edition, General Microbiology, MacMillan Education Ltd. Publisher.
3. Powar, C.B. and Dagniwala, H.F. 2012, General Microbiology, Volume I and II, Himalaya Publishing House, Delhi.
4. Sharma, P.D. 2010, Microbiology, Rastogi Publications, Meerut. 142.
5. Clinical microbiology by Usman Waheed, Asim Ansari, Anwar Ullah and Ihsan Ali., 1st Edition, 2013. **(Online available)**
6. General Microbiology by Linda Bruslind, 1st Edition. **(Online available)**
7. General Microbiology by H.G. Schlegel, 6th Edition. **(Online available)**

Bachelor of Science (Medical) Semester–I
Session 2021-22
MICROBIOLOGY
Course Title: PRACTICAL – (Related to Fundamentals of Microbiology)
Course Code: BSMM-1343 (P)
(PRACTICAL)

Time: 3 Hrs. **Marks: 20**

Instructions for the practical examiner: Question paper is to be set on the spot jointly by theInternal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

LIST OF PRACTICALS

1. To study the essentials of a microbiology laboratory.
2. To study various parts of a laboratory microscope.
3. To study various sterilization techniques.
4. To prepare the cultures media for the cultivation of various microorganisms.
5. To study various laboratory techniques for the cultivation and isolation of pure cultures of microorganisms.
6. To perform the simple staining of bacterial cell.
7. To perform the differential staining of bacterial cell.
8. To study the typical growth curve of bacteria.

Bachelor of Science (Medical) Semester–II
Session 2021-22
MICROBIOLOGY
Course Title: BASIC FOOD MICROBIOLOGY
Course Code: BSMM-2343 (I)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand the intrinsic and extrinsic factors affecting the growth of various microorganisms in foods and microorganisms important in food microbiology.

CO2: Learn about the origin and preparation of fermented foods (bread, dosa, idli, warri, tempeh, miso).

CO3: Understand the Principles of food preservation and various methods of preservation (high temperature, low temperature, drying, chemical preservatives) and applications of prebiotics and probiotics.

CO4: Understand the spoilage of food (milk and milk products, cereal and cereal products, vegetable and fruits, meat and meat products, canned foods) and food poisoning and infection.

Bachelor of Science (Medical) Semester–II
Session 2021-22
MICROBIOLOGY
Course Title: BASIC FOOD MICROBIOLOGY
Course Code: BSMM-2343 (I)
(THEORY)

Time: 3 Hrs. **Max. Marks: 100**
Theory Marks: 60
Practical Marks: 20
CA: 20

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT–I

1. Food as a substrate for microorganisms, intrinsic and extrinsic factors affecting the growth of various microorganisms in foods. Microorganisms important in food microbiology–bacteria, yeasts and molds, sources of contamination in foods.

UNIT–II

2. Fermented foods, origin of fermentation as a method of preparing indigenous foods, bread, dosa, idli, warri, tempeh, miso

UNIT–III

3. Principles of food preservation and spoilage, asepsis, anaerobic conditions, aseptic packaging, preservation methods, high temperature, low temperature, drying, chemical preservatives. Applications of prebiotics and probiotics.

UNIT–IV

4. Spoilage of various milk and milk products, cereal and cereal products, vegetable and fruits, meat and meat products, canned foods. Food poisoning and food infection. *Staphylococcal*, *Clostridium* and *Salmonella* intoxications.

Books Recommended:

1. Frazier. W.C. and Westhoff, D.C. 2006, 26th edition, Food Microbiology, Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Banwart, G.J., 2012, Basic Food Microbiology, Springer Verlag, New Delhi.
3. Powar, C.B. and Dagniwala, H.F. 2012, General Microbiology Volume II. Himalaya Publishing House, New Delhi. 128

Bachelor of Science (Medical) Semester–II
Session 2021-22
MICROBIOLOGY
Course Title: PRACTICAL - (Related to Basic Food Microbiology)
Course Code: BSMM-2343 (P)
(PRACTICAL)

Time: 3 Hrs. **Marks: 20**

Instructions for the practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

LIST OF PRACTICALS

1. To enumerate the total microbial cells in a suspension by serial dilution and pour plating.
2. To enumerate the total bacteria in milk by direct microscopic count.
3. To measure the size of microbial cells by ocular micrometer.
4. To study the morphology of bacteria, yeasts and molds.
5. To check the bacteriological quality of raw milk by methylene blue reduction test.
6. Baking of bread and making of dhokla&idli.
7. To study the spoilage of microorganisms present in spoiled bread and raw milk.

Bachelor of Science (Medical) Semester–III
Session 2021-22
MICROBIOLOGY
Course Title: MICROBIAL NUTRITION AND METABOLISM
Course code: BSMM-3343 (I)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

- **CO1:** Understand the nutrition and requirements for growth of microorganisms, mediumdesigning and types of microorganisms on the basis of nutrition.
- **CO2:** Understand the transport of nutrients across the cell membrane.
- **CO3:** Learn about the laws of thermodynamics and electron transport chain of bacteria.Alsounderstand the growth and metabolic pathways for breakdown of glucose (glycolysis,Kreb's cycle fermentation, pentose phosphate pathways) and gluconeogenesis.
- **CO4:** Learn about the enzymes, kinetics and biosynthesis of nucleic acids.

Bachelor of Science (Medical) Semester–III
Session 2021-22
MICROBIOLOGY
Course Title: MICROBIAL NUTRITION AND METABOLISM
Course code: BSMM-3343 (I)
(THEORY)

Examination Time: 3 Hrs.

Max. Marks: 100
Theory Marks: 60
Practical Marks: 20
CA: 20

Instructions for the Paper Setter: Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT–I

1. Nutrition, requirements for growth of microorganisms, nutrients and accessory constituents, medium designing. Nutritional types of microorganisms (photolithotrophs, photoorganotrophs, chemolithotrophs and chemoorganotrophs)

UNIT–II

2. Transport of nutrients across the cell membrane, diffusion, passive transport, active transport, and group translocation for the transport of nutrients across the membrane.

UNIT–III

3. Bioenergetics; Laws of thermodynamics, entropy, enthalpy and free energy of reaction standard, oxidative phosphorylation, electron transport, respiratory chains of bacteria, energy metabolism in aerobic and anaerobic microorganisms, pathways for breakdown of glucose (glycolysis, Kreb's cycle fermentation, pentose phosphate pathways), gluconeogenesis, metabolism of starch & cellulose by bacteria.

UNIT–IV

4. Assimilation of nitrogen, biosynthesis of nucleic acids, for synthesis of purine and pyrimidine nucleotides. Enzymes, kinetics, Michaelis Menten equation and allosteric enzymes.

Books Recommended:

1. Pelczar, M.I., Chan, E.C.S. and Krieg, N.R. 2011, 5th edition, Microbiology. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Stanier, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. 2005, 5th edition, General Microbiology, MacMillan Education Ltd. Publisher.
3. Powar, C.B. and Dagniwala, H.F. 2012, General Microbiology, Volume I and II, Himalaya Publishing House, Delhi.
4. Sharma, P.D. 2010, Microbiology, Rastogi Publications, Meerut. 142.
5. Bacterial physiology and metabolism by Byung Hong Kim and Geoffrey Michael Gadd. **(Online available**

Bachelor of Science (Medical) Semester–III
Session 2021-22
MICROBIOLOGY
Course Title: PRACTICAL (Microbial Nutrition and Metabolism)
Course code: BSMM-3343 (P)
(PRACTICAL)

Time: 3 Hrs. **Marks: 20**

Instructions for the practical examiner: Question paper is to be set on the spot jointly by theInternal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

LIST OF PRACTICALS

1. Isolation and enumeration of total bacteria from soil by pour plating and spread plating.
2. Comparison of growth on complex medium and defined or minimal medium.
3. Distinction between fermenting and non-fermenting microorganisms.
4. Effects of various concentrations of carbon source on bacterial growth.
5. Effects of various concentrations of nitrogen source on bacterial growth.
6. Effect of temperature on bacterial growth.
7. Effect of pH on bacterial growth.

Bachelor of Science (Medical) Semester–IV
Session 2021-22
MICROBIOLOGY
Course Title: MICROBIAL ECOLOGY
Course Code: BSMM-4343 (I)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

- **CO1:** Understand the Diversity of various microbial habitats.
- **CO2:** Understand the various microbial interactions and competition for survival in nature (for nutrients, space and oxygen).
- **CO3:** Understand the role of microorganisms in geochemicals cycles, concept of microbial toxins, biofertilizers and bioinsecticides.
- **CO4:** Understand the microbiological aspects of pollution and concept of BOD and COD, effluent treatment, bioremediation and bioleaching.

Bachelor of Science (Medical) Semester–IV
Session 2021-22
MICROBIOLOGY
Course Title: MICROBIAL ECOLOGY
Course Code: BSMM-4343 (I)
(THEORY)

Time: 3 Hrs. **Max Marks:100**
Theory Marks:60
Practical Marks: 20
CA: 20

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT–I

1. Diversity of microbial habitats: Environmental selecting factors:- physical, chemical and biological types of microbial habitats:- atmospheric, aquatic and terrestrial environments.

UNIT–II

2. Microbial interactions, antagonism, commensalism, symbiosis, parasitism miscellaneous associations in nature. Competition for survival in nature (for nutrients, space, oxygen).

UNIT–III

3. Role of microorganisms in geochemicals cycles: Carbon cycle, nitrogen cycle, phosphorus cycle and sulphur cycle, microbial toxins in the environment: Types of Microbial toxins, ecological consequences of microbial toxins as insecticidal agents, bioinsecticides, biofertilizers.

UNIT–IV

4. Concept of BOD and COD, Sewage and effluent treatment by primary, secondary and tertiary methods. Role of microbes in bioremediation of persistent pollutants and bioleaching of metals.

Books Recommended: (Edition of books updated)

1. Edmonds, P., 1978, Microbiology: An Environmental Perspective, MacMillan Publishing Co., Inc., New York.
2. Powar C.B. and Danginwala, H.F., 2017, General Microbiology, Volume II, 2nd ed. Himalaya Publishing House, New Delhi.
3. Sharma, P.D., 2010, Microbiology, Rastogi Publication, Meerut.
4. Pleczar, M.J., Chan, E.C.S. and Krieg N.R., 2011 (reprint), Microbiology, 2nd ed. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
5. Patel, A.H., 2011, Industrial Microbiology, 2nded. Macmillan India Ltd., Delhi.

Bachelor of Science (Medical) Semester–IV
Session 2021-22
MICROBIOLOGY
Course Title: PRACTICAL (Related to Microbial Ecology)
Course Code: BSMM-4343 (P)
(PRACTICAL)

Time: 3 hrs **Marks: 20**

Instructions for the practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

LIST OF PRACTICALS

1. Isolation and enumeration of fungi from air and soil by pour plating and spread plating.
2. Determination of dissolved oxygen content (DO) of the given water sample by Titrimetric method.
3. Determination of COD of the given water sample by Titrimetric method.
4. To conduct bacteriological examination of water sample by MPN method.
5. To isolate symbiotic nitrogen bacteria from root nodules.
6. To perform crowded plate method for studying microbial interactions.
7. Determination of B.O.D.

Bachelor of Science (Medical) Semester–V
Session 2021-22
MICROBIOLOGY
Course Title: APPLIED MICROBIOLOGY-I
Course Code: BSMM-5343 (I)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

- **CO1:** Understand the history and scope of industrial microbiology, culture collection and preservation of stock cultures
- **CO2:** Understand the screening methods of isolation, fermentation media, its composition and characteristics of ideal production medium.
- **CO3:** Learn about the fermentation processes, types of fermentation, design of fermentor and batch, fedbatch and continuous culture.
- **CO4:** Understand the principles of recovery and purification of fermentation products, fermentation economics and patent.

Bachelor of Science (Medical) Semester–V
Session 2021-22
MICROBIOLOGY
Course Title: APPLIED MICROBIOLOGY-I
Course Code: BSMM-5343 (I)
(THEORY)

Examination Time: 3 Hrs.

Max Marks:100
Theory Marks:60
Practical Marks: 20
CA: 20

Instructions for the Paper Setter: Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT- I

Microorganisms in Industry: Historical development, definition and scope of industrial microbiology; contribution of Louis Pasteur in fermentation; sources of industrial microorganisms and their essential characteristics, natural habitats, cultural collections and preservation of stock cultures.

UNIT- II

Screening of Microorganisms: Isolation of industrially important microorganisms, primary and secondary screening methods for isolating useful Yeast, Bacteria and Fungi. Fermentation media, composition of production media, characteristics of an ideal production medium, raw materials.

UNIT- III

Fermentation and Fermentation processes: Fermentation as biological activity, Types of industrial fermentations (submerged, solid state and continuous fermentation). Designof fermentor (body construction, aeration, agitation and control of septic conditions), Basics of batch culture, fedbatch culture and continuous culture.

UNIT- IV

Recovery and Purification of Fermentation Products: General principles of separation of fermentation products, solid particles, foam separation, separation by filtration, centrifugation, cell disruption, liquid - liquid chromatography, ion exchange chromatography. Fermentation economics; planning, fermentation designing, process designing, market potential and recovery costs for the industrial set up. Patent (composition, subject matter, characteristics, protection of rights of inventor, cost).

Books Recommended:

1. Casida, L.E. 2016, 2nd Edition.*Industrial Microbiology*. Wiley Eastern Ltd., New Delhi.
2. Stanbury, P.F. Whittaker, A. and Hall S.J. 2016, 3rd Edition. Principles of Fermentation Technology. Elsevier Science Ltd., U.K.
3. Patel, A.H. 2011, 2nd Edition. *Industrial Microbiology,* Macmillan India Ltd., Delhi.
4. Trevan M.D., Saffey, S., Goulding, K.H. and Stanberry, P. 2007. *Biotechnology: The Biological Principles,* Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Freifelder, D. 2006, 2nd Edition. Microbial Genetics. Jones and Barttett Publishers Inc., Boston.
6. Applied Microbiology by Corinne Whitby and Torben Lund Skovhus. **(Online available)**
7. Applied Microbiology by Perlman. **(Online available)**

Bachelor of Science (Medical) Semester–V
Session 2021-22
MICROBIOLOGY
Course Title: PRACTICAL (Related to Applied Microbiology-I)
Course Code: BSMM-5343 (P)
(PRACTICAL)

Time: 3 Hrs. **Marks: 20**

Instructions for the practical examiner: Question paper is to be set on the spot jointly by theInternal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

List of Practicals:

1. Isolation of various types of microorganisms from (a) soil (b) fruits.

2. Screening of some industrially important microorganisms.

    a. Amylase producers

    b. Protease producers

3. Protein estimation by Lowry method.

4. Preservation of industrially important microorganisms by various methods (a) storage in 10% glycerol (b) storage in mineral oil.

5. Determination of % viability of yeast cells by haemocytometer.

Bachelor of Science (Medical) Semester–VI
Session 2021-22
MICROBIOLOGY
Course Title: APPLIED MICROBIOLOGY-II
Course Code: BSMM-6343 (I)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

- **CO1:**Understand the processing and microbiology of different fermented foods.
- **CO2:** Understand the role of yeast in fermentation process and the production of different industrial chemicals.
- **CO3:** Understand the role of microorganisms in preparation of alcoholic beverages and industrial enzymes.
- **CO4:** Understand the role of microorganisms in the production processes of vitamins, amino acids and antibiotics.

Bachelor of Science (Medical) Semester–VI
Session 2021-22
MICROBIOLOGY
Course Title: APPLIED MICROBIOLOGY-II
Course Code: BSMM-6343 (I)
(THEORY)

Time: 3 Hrs. **Max Marks:100**
Theory Marks:60
Practical Marks: 20
CA: 20

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT-I

1. Fermentation Process of Fermented Foods: Fermented cereal, legume and milk products. Microbiology of natural fermentation. Sauerkraut, Yoghurt, Soya sauce, Cheese.

UNIT-II

2. Microbial Cell as Fermentation Products: Baker's and brewer's yeast, single cell protein, mushroom farming. Production of industrial chemicals: Acetic acid, Citric acid, Acetone and Butanol.

UNIT-III

3. Production of alcoholic Beverages: Beer, wine and distilled beverages – Whisky, Brandy, Vodka, Gin production and applications of industrial enzymes: Amylases, Proteases, immobilization of enzymes.

UNIT-IV

4. Vitamins and Amino acids production by Microorganisms: Riboflavin (B2) and Cyanocobalamin (B12), Glutamic acid. Production of antibiotics: Penicillin and Streptomycin.

Books Recommended:

1. Read, G. 1982. Prescott and Dunn, *Industrial Microbiology.*CBS Publishers & Distributers, New Delhi.
2. Casida, L.E. 1991. *Industrial Microbiology*. Wiley Eastern Ltd., New Delhi.
3. Patel, A.H. 1984. *Industrial Microbiology*. Macmillan India Ltd., Delhi.
4. Trevan, M.D. Saffey, S., Goulding, K.H. and Stanberry, P. 1988. *Biotechnology: The Biological Principles*, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Wiseman, A. 1995. *Handbook of Enzyme Biotechnology*. Ellis Harwood Ltd., London.
6. Wood, J.B.B., 1998. *Microbiology of Fermented Foods*, Volumes 1 and 2, Blackie Academic and Professional, London.
7. Power C.B. and Dagniwala, H.F.1992. *General Microbiology*. Volume-2. Himalaya Publishing House, New Delhi.

Bachelor of Science (Medical) Semester–VI
Session 2021-22
MICROBIOLOGY
Course Title: PRACTICAL (Related to Applied Microbiology-II)
Course Code: BSMM-6343 (P)
(PRACTICAL)

Time: 3 Hrs **Marks: 20**

Instructions for the practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

LIST OF PRACTICALS:

1. Production of amylases and proteases in liquid medium using the selected organisms.
2. Assay of various crude enzymes preparations
    a. Amylase
    b. Protease
3. Production of alcohol from molasses and cereal grains.
4. Immobilization of microbial cells and enzyme preparations by calcium alginate entrapment method.
5. Comparison of submerged and solid state fermentation techniques for amylase production.
6. To study the production of wine and vinegar.
7. To study the kinetics of growth of yeast in batch/continuous culture.