PG MICROBIOLOGY

PCMBB20: FOOD, AGRICULTURE AND ENVIRONMENTAL MICROBIOLOGY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: I	PCMBB20	Food, Agriculture and Environmental Microbiology	Theory	Core	6	5	100

Course Objective: To make the students familiarize on Food, Agriculture and Environmental aspects of Microbiology.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Analyse the principles in food preservation.

CO2: Communicate diseases associated with food.

CO3: Discuss the role of microorganisms in soil and microbial interaction.

CO4: Utilize the knowledge on biogeochemical cycles to produce biofertilizers.

CO5: Assess information about microbiological quality of air and water.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	M	L	H	M
CO2	H	L	L	M	L	H
CO3	H	H	M	H	L	H
CO4	H	L	L	M	M	H
CO5	H	H	M	H	L	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	M	L	H	M
CO2	H	M	M	L	L	H
CO3	H	H	M	H	L	H
CO4	H	L	L	L	M	H
CO5	H	H	M	H	L	H

H – HIGH (3)
M – MODERATE (2)
L – LOW (1)

COURSE SYLLABUS

UNIT-I: Food Microbiology. (15 hours)

1.1 Importance of studying Food microbiology- Primary sources of microorganisms in foods. (K1,K2)

1.2 Factors influencing microbial growth in foods - extrinsic and intrinsic.(K1,K2)

1.3 Principles of food preservation - preservation methods - irradiation - drying, heat processing, chilling and freezing, high pressure, modification of atmosphere and chemical preservatives. (K1,K2,K3,K4)

1.4 Nutritional value of fermented foods. (K2,K3,K4,K5,K6)

1.5 SCP and their uses. (K1,K2,K3)

1.6 Contamination, preservation and spoilage of fruits, vegetables, meat and poultry products. (K1,K2,K3)

UNIT-II: Dairy Microbiology. (15 hours)

1.1 Microbiology of fermented milk - Starter lactic cultures (K1,K2)

1.2 Fermented milk products (cheese, yoghurt, acidophilus milk, kefir, kumis). (K1,K2,K3)

1.3 Food sanitation in food manufacture and in the retail trade. (K1,K2,K3)

1.4 (HACCP) - Food control agencies and its regulations. (K1,K2,K3)

1.5 Food borne disease.(K1,K2)

1.6 Milk borne diseases. (K1,K2)

UNIT-III: Soil Microbiology. (15 hours)

3.1 Distribution of soil microorganisms in soil. (K1,K2)

3.2 Factors influencing the soil microflora. (K1,K2)

3.3 Role of microorganisms in soil fertility. (K1,K2)

3.4 Interactions among microorganisms, mutualisms, commensalism, competition, amensalism, parasitism, predation. (K1,K2)

3.5 Interactions between microbes and plants - rhizosphere, phyllosphere. (K1,K2)

3.6 Mycorrhizae, root nodule bacteria. (K1,K2,K3,K4)

UNIT-IV: Biogeochemical cycle and Biofertilizers. (15 hours)

4.1 Biogeochemical - carbon cycle - role of microbes in carbon cycle.(K1,K2)

4.2 Nitrogen cycle - mechanism of biological nitrogen fixation - ammonification - nitrification - denitrificatioin and microorganisms involved in such processes. .(K1,K2)

4.3 Phosphorous cycle. .(K1,K2)

4.4 Sulphur cycle. (K1,K2)

4.5 Biofertilizer for sustainable agriculture *Rhizobium, Azospirillium, Azotobacter*.(K1,K2,K3,K4)

4.6 *Azolla*, BGA -mass production methods - applications methods and crop response of biofertilizers.(K1,K2,K3,K4)

UNIT-V: Aero Microbiology and Aquatic Microbiology. (15 hours)

5.1 Droplet, Droplet nuclei and Aerosol. (K1,K2)

5.2 Assessment of air quality. (K2,K3,K4)

5.3 Airborne diseases, their symptoms and preventive measures, water borne disease.(K1,K2)

5.4 Types of water – Assessment of microbiological quality of water.(K2,K3,K4)

5.5 Treatment of municipal water (K4,K5)

5.6 Types of wastes, characterization of solid and liquid waste. Sewage treatment-composting. (K3,K4,K5)

TEXT BOOKS:

1. Frazier W.C. and West Hoff D.C (2008). Food Microbiology. 4th edition. Mc Graw Hill, New York.
2. Joseph C. Daniel (1999). Environmental aspects of Microbiology. 1st edition, Bright Sun publications, Chennai.
3. Subba Rao NS (2004). Soil Microbiology. 4th edition, Oxford and BH Publishing Co.Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. Adam M.R. and Moss M.O (2004). Food Microbiology. 2nd edition, New international pvt. Ltd., publishers.UK.
2. Banwart G. J (2004). Basic Food Microbiology. 2nd edition, CBS Publishers and Distributors, New Delhi.
3. James M. Jay (2003). Modern Food Microbiology. 4th edition, CBS Publishers, New Delhi.
4. Vijaya Ramesh K (2004). Environmental Microbiology. 1st edition, MJP publishers. Chennai.
5. Singh D.P and Dwivedi S.K (2005). Environmental Microbiology and Biotechnology. 1st edition, New Age International (P) Ltd., New Delhi.
6. Mishra RR (2004). Soil Microbiology. 1st edition, CBS Publishers and distributors, New Delhi.
7. Rangaswami G and Mahadevan A (2002). Disease of Crop Plants in India. 4th edition, PHI Learning (P) Ltd., New Delhi.
8. Atlas R.M. and Bartha R (1992). Microbial Ecology, Fundamental and Application, 3rd edition, Bengamin and Cummings. United States.

OER:

1. http://www.loc.gov/
2. http://library.clark.edu/
3. http://www.dli.ernet.in/
4. http://www.loc.gov/education/

PCMBD20: MEDICAL MICROBIOLOGY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: II	PCMBD20	Medical Microbiology	Theory	Core	5	5	100

Course Objective: To provide an in depth understanding of the pathogenic mechanism of microorganisms, the diseases caused, its laboratory diagnosis and control measures.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Outline the basics of Medical Microbiology and describe the mode of transmission of various pathogens.

CO2: Select methods to identify the causative agents for clinical diagnosis.

CO3: Analyse pathogenic microorganism of bacteria and its mechanism of pathogenesis.

CO4: Discuss on pathogenic fungi and parasites.

CO5: Compile virus structure, multiplication, classification and medical importance.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M	M	H	H
CO2	H	H	H	H	H	H
CO3	H	H	H	M	M	H
CO4	H	L	L	L	M	H
CO5	H	M	L	L	M	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M	M	M	H
CO2	H	H	H	H	M	H
CO3	H	H	H	M	M	H
CO4	H	L	L	L	M	H
CO5	H	M	L	L	M	H

H – HIGH (3)
M – MODERATE (2)
L – LOW (1)

COURSE SYLLABUS

UNIT-I: Introduction to Medical Microbiology. (10 hours)

1.1 Basics in Medical microbiology - Infectious diseases overview. (K1,K2)

1.2 Medically important microbes. (K1,K2)

1.3 Microbial diseases - sources, route of transmission. (K1,K2)

1.4 Pathogenesis - adhesion, invasion, host cell damage, release of pathogens. (K1,K2)

1.5 Microbial virulence and virulence factors - Signs and symptoms of microbial diseases. (K1,K2)

1.6 Treatment, Prevention and control of microbial infections. (K1,K2,K3)

UNIT-II: Diagnostic Microbiology. (10 hours)

2.1 Diagnosis of microbial diseases – Collection and transport of clinical specimens. (K2,K3,K4,K5)

2.2 Preliminary processing of clinical samples- identification and cultural characteristics. (K2,K3,K4,K5)

2.3 Detection of Biochemical properties of pathogens. (K2,K3,K4,K5)

2.4 Immunodiagnosis. (K2,K3,K4,K5)

2.5 Molecular diagnosis of microbial diseases. (K2,K3,K4,K5)

2.6 Modern methods of microbial diagnosis. (K2,K3,K4,K5)

UNIT-III: Medical Bacteriology. (20 hours)

3.1 Bacteriology - Characteristics, classification, pathogenesis, pathology, diagnosis, treatment, prevention and control of diseases caused by *Staphylococci, Streptococci.* (K1,K2,K3,K4)

3.2 *Neisseria, Bacillus, Clostridium.* (K1,K2,K3,K4)

3.3 *Corynebacterium and Mycobacteria.* (K1,K2,K3,K4)

3.4 Members of Family Enterobacteriaceae., (K1,K2,K3,K4)

3.5 *Vibrio, Pseudomonas.* (K1,K2,K3,K4)

3.6 Spirochaetes, Rickettsiae and Chlamydiae. (K1,K2,K3,K4)

UNIT-IV: Medical Mycology and Parasitology. (20 hours)

4.1 Mycology - Human mycotic infections caused by Dermatophytes (K1,K2)

4.2 *Histoplasma, Cryptococcus, Candida,* (K1,K2)

4.3 Mycotic Mycetoma - Mycotoxins. (K1,K2)

4.4 Parasitology - Medical importance of *Entamoeba, Giardia, Lieshmania,* (K1,K2)

4.5 *Plasmodium, Taenia, Ascaris, Wucherhiria*. (K1,K2)

4.6 Laboratory techniques used in the diagnosis of fungal and parasitic diseases. (K1,K2,K3,K4)

UNIT-V: Virology. (15 hours)

5.1 Viruses – Structure, multiplication, classification and medical importance of DNA viruses – Adeno, Pox. (K1,K2)

5.2 Herpes, Hepatitis Virus. (K1,K2)

5.3 RNA viruses - Picorna, Orthomyxo, Paramyxo. (K1,K2)

5.4 Virus causing SARS, MERS and SARS-CoV2 (K1,K2)

5.5 Oncogenic Viruses (Papilloma and Polyoma), (K1,K2)
5.6 Rhabdo and HIV virus(K1,K2)

TEXT BOOKS:

1. Ananthanarayan R & Paniker C.K.J. (2013). Text Book of Microbiology, 9th edition, Universities Press, Hyderabad.
2. Jawetz, Melnick, &Adelberg's. (2013). Medical Microbiology. 26th edition. McGraw-Hill, New York.
3. Mehrotra RS and Aneja KR (2006). An Introduction to Mycology. 1st edition, New age international publishers, Chennai.
4. Subhash Chandra Parija (2013). Text book of Medical Parasitology. 4th edition, All India Publishers and Distributors (Medical Books Publishers), New Delhi.
5. Dimmok N.J and Primrose S.B (1994). Introduction to modern virology 4th edition, Blackwell scientific company publications, United States.

REFERENCE BOOKS:

1. Tille P. Bailey and Scott (2013). Diagnostic Microbiology, 13th edition, Mosby Publishers, United States.
2. Satish Gupte (2005). The Short Textbook of Medical Microbiology. 8th edition, Jaypee Brothers, Medical publishers (P) Ltd., New Delhi.
3. Monica Cheesbrough (2003). District Laboratory Practice in Tropical Countries. Part 1 & 2, Cambridge University Press.
4. Jagadish Chander (1996). A text book of Medical Mycology. 1st edition. Interprint, New Delhi.
5. Chatterjee K.D (2016). Parasitology, Protozoology& Helminthology. 13th edition. Joe media Publishers. Calcutta.

OER:

1. http://www.gutenberg.org/
2. http://www.free-ebooks.net/
3. http://www.bookrix.com
4. http://www.e-booksdirectory.com/
5. http://bookboon.com/
6. http://www.freebooks.com/ebooks/

PEMBE20: ELECTIVE-IIIA: BIOINOCULANTS TECHNOLOGY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: III	PEMBE20	Bioinoculants Technology	Theory	Core Elective	3	3	100

Course Objective: To provide the learners an overview on the potentials of microbes as fertilizers and their beneficial impacts in soil and agriculture.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Outline the importance of bioinoculant technology and discuss on the significance of biofertilizers.

CO2: Demonstrate the mass production and applications of bio fertilizer and their impact on plant growth.

CO3: Identify in-depth information on the mycorrhizal taxonomy, occurrence and distribution.

CO4: Explain the types of mycorrhizal associations and quantification.

CO5: Formulate the growth of phosphate solubilizing microbes.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	H	M	L	H
CO2	H	H	H	L	L	H
CO3	H	M	M	H	M	H
CO4	H	M	H	H	M	H
CO5	H	M	H	M	M	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	H	H	L	H
CO2	H	L	H	M	L	H
CO3	H	M	H	L	L	H
CO4	H	H	H	M	L	H
CO5	H	L	H	L	L	H

H – HIGH (3)
M – MODERATE (2)
L – LOW (1)

COURSE SYLLABUS:

UNIT– I: Symbiotic Bacterial N_2 fixers. (9 hours)

1.1 General account of the microbes used as biofertilizers for crop plants. (K1,K2)

1.2 Advantages of Biofertilizers over chemical fertilizers. (K1,K2)

1.3 Symbiotic N2 fixers: Rhizobium - Isolation, characterization, identification, classification. (K1,K2, K3,K4)

1.4 Inoculum production and field application. (K1,K2,K3,K4,K6)

1.5 Frankia - Isolation, characterization. (K1,K2,K3,K4)

1.6 Actinorrhizal nodules – non-leguminous crop symbiosis. (K1,K2)

UNIT – II: Non Symbiotic N_2 fixers. (9 hours)

2.1 Introduction to non-symbiotic N_2 fixation. (K1,K2)

2.2 Non - Symbiotic N2 fixers – Azospirillum. (K1,K2)

2.3 Free living - Azotobacter . (K1,K2)

2.4 Isolation of free living nitrogen fixers from soil. (K1,K2,K3)

2.5 Characterization of non-symbiotic N_2 fixers. (K1,K2,K3)

2.6 Mass inoculum production and field application. (K1,K2, K3, K4,K6)

UNIT – III: Algal Biofertilizers. (9 hours)

3.1 Symbiotic N2 fixers – Cyanobacteria. (K1,K2)

3.2 Azolla – Isolation and characterization. (K1,K2,K3)

3.3 Mass multiplication- production. (K1,K2,K3,K4)

3.4 Role of Azolla in rice cultivation .(K1,K2)

3.5 Crop response to algal biofertilizers. (K1,K2)

3.6 Field application - immobilization. (K1,K2,K3)

UNIT – IV: Phosphate Solubilizers. (9 hours)

4.1 Phosphate solubilizers - Phosphate solubilizing microbes. (K1,K2)

4.2 Isolation of phosphate solubilizers from soil. (K1,K2,K3,K4)

4.3 Characterization of phosphate solubilizers, (K1,K2, K3,K4)

4.4 Mass inoculum production. (K1,K2, K3,K4)

4.5 Field application and crop response. (K1,K2,K3)

4.6 Mechanism of Phosphate solubilization. (K1,K2)

UNIT – V: Mycorrhizal Biofertilizers. (9 hours)

5.1 Mycorrhizal bioinoculants – classification. (K1,K2)

5.2 Importance of mycorrizal Ectomycorzhizae - Endomycorrhizae - Ectendo mycorrhizae - Taxonomy of mycorrhizae. (K1,K2)

5.3 Isolation of VA mycorrhizae. (K1,K2, K3,K4)

5.4 Quantification and assessment of VAM in roots . (K1,K2,K3,K4)

5.5 Mass inoculum production of VAM . (K1,K2,K3,K4,K6)

5.6 Field applications and advantages of Ectomycorrhizae and VAM. (K1,K2,K3)

TEXT BOOKS

1. Kannaiyan, S. (2003). Bioetchnology of Biofertilizers, CHIPS, Texas.
2. Dubey R.C (2005). A Text of Biotechnology. Multicolour Illustrative edition, S.Chand and Company Ltd., New Delhi.
3. Subba Rao NS (2004). Soil Microbiology. 4th edition, Oxford and BH Publishing Co.Pvt. Ltd., New Delhi.

REFERENCES:

1. Mahendra K. Rai (2005). Hand book of Microbial biofertilizers, The Haworth Press, Inc. New York.
2. Reddy, S.M. et. al. (2002). Bioinoculants for sustainable agriculture and forestry, Scientific Publishers.
3. Subba Rao N.S (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt. Ltd. NewDelhi.
4. Subba Rao N.S. (1988) Biofertilizers in Agriculture and forestry Oxford and IBH Publishing Co., Ltd., New Delhi.

OER:

DIGITAL LIBRARIES:

1. http://www.loc.gov/
2. http://library.clark.edu/
3. http://www.dli.ernet.in/
4. http://www.loc.gov/education/

PIMBA20: IEC- I: PUBLIC HEALTH MICROBIOLOGY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/ W	Credits	Marks
SEM: I	PIMBA20	Public Health Microbiology	Theory	Independent elective	-	2	100

Course Objective: To provide in depth knowledge about significance of public health at theoretical and practical levels.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Explain the significance of public health.

CO2: Communicate the mode of transmission of human diseases.

CO3: Discuss the role of medically important pathogens and the diseases caused.

CO4: Outline the vector complex interactions between the pathogens and host.

CO5: Create awareness on hospital-acquired infections, prevention and its control measures.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	H	H	L	H
CO2	H	H	H	H	L	H
CO3	H	H	M	M	M	H
CO4	H	H	M	M	M	H
CO5	H	H	L	M	L	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	H	H	H	H
CO2	H	L	M	H	L	H
CO3	H	L	M	H	L	H
CO4	H	L	M	H	L	H
CO5	H	M	H	M	M	H

H – HIGH (3)
M – MODERATE (2)
L – LOW (1)

COURSE SYLLABUS

UNIT–I: Water Borne Diseases.

1.1 Overview on common water borne diseases. (K1,K2)
1.2 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of hepatitis. (K1,K2,K3,K4)
1.3 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of cholera, typhoid. (K1,K2,K3,K4)
1.4 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of amoebiasis, giardiasis. (K1,K2,K3,K4)
1.5 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of poliomyelitis. (K1,K2,K3,K4)
1.6 Non Diarrhoeal diseeases (bacterial and viral). (K1,K2,K3,K4)

UNIT–II: Air Borne Diseases.

2.1 Overview on common air-borne diseases. (K1,K2)
2.2 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis of pneumonia. (K1,K2,K3,K4)
2.3 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis of diphtheria. (K1,K2,K3,K4)
2.4 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis of tuberculosis. (K1,K2,K3,K4)
2.5 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis of anthrax. (K1,K2,K3,K4)
2.6 Microbiology of causative agents, epidemiology, pathogenesis, laboratory diagnosis of influenza and measles. (K1,K2,K3,K4)

UNIT–III: Food Borne Diseases.

3.1 Concept on food borne infections and food intoxication. (K1,K2)
3.2 Microbiology of causative microorganisms, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of Staphylococcal food intoxication. (K1,K2,K3,K4)
3.3 Microbiology of causative microorganisms, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of Clostridial food poisoning. (K1,K2,K3,K4)
3.4 Microbiology of causative microorganisms, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of Salmonellosis. (K1,K2,K3,K4)
3.5 Microbiology of causative microorganisms, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of Shigellosis. (K1,K2,K3,K4)
3.6 Microbiology of causative microorganisms, epidemiology, pathogenesis, laboratory diagnosis, prevention and control of travelers' diarrhea. (K1,K2,K3,K4)

UNIT–IV: Vector Borne Diseases.

4.1 Overview on common vector-borne diseases and their vectors (K1,K2)
4.2 Microbiology of causative organisms, epidemiology, pathogenesis, laboratory diagnosis and prevention and control of visceral leishmaniasis. (K1,K2,K3,K4)
4.3 Microbiology of causative organisms, epidemiology, pathogenesis, laboratory diagnosis and prevention and control of malaria. (K1,K2,K3,K4)
4.4 Microbiology of causative organisms, epidemiology, pathogenesis, laboratory diagnosis and prevention and control of filariasis. (K1,K2,K3,K4)
4.5 Microbiology of causative organisms, epidemiology, pathogenesis, laboratory diagnosis and prevention and control of Japanese encephalitis and dengue. (K1,K2,K3,K4)
4.6 Microbiology of causative organisms, epidemiology, pathogenesis, laboratory diagnosis and prevention and control of West Nile fever and plague. (K1,K2,K3,K4)

UNIT–V: Hospital Acquired Infection

5.1 Concept on common nosocomial infections (K1,K2)
5.2 Disinfection procedures of hospital environment. (K1,K2,K3)
5.3 Equipments and materials used in hospitals. (K1,K2,K3)
5.4 Methods of disposal of infective hospital waste. (K1,K2,K3,K4)
5.5 Methods of disposal of laboratory materials. (K1,K2,K3,K4)
5.6 Monitoring of sanitation in hospital environment. (K1,K2,K3,K4)

TEXT BOOKS:

1. Ananthanarayan R & Paniker C.K.J. (2013). Text Book of Microbiology, 9th edition, Universities Press, Hyderabad.
2. Jawetz, Melnick, &Adelberg's. (2013). Medical Microbiology. 26th edition. McGraw-Hill, New York.
3. Mehrotra RS and Aneja KR (2006). An Introduction to Mycology. 1st edition, New age international publishers, Chennai.
4. Subhash Chandra Parija (2013). Text book of Medical Parasitology. 4th edition, All India Publishers and Distributors (Medical Books Publishers), New Delhi.
5. Dimmok N.J and Primrose S.B (1994). Introduction to modern virology 4th edition, Blackwell scientific company publications, United States.

REFERENCE BOOKS:

1. Tille P. Bailey and Scott (2013). Diagnostic Microbiology, 13th edition, Mosby Publishers, United States.
2. Satish Gupte (2005). The Short Textbook of Medical Microbiology. 8th edition, Jaypee Brothers, Medical publishers (P) Ltd., New Delhi.

3. Monica Cheesbrough (2003). District Laboratory Practice in Tropical Countries. Part 1 & 2, Cambridge University Press.
4. Jagadish Chander (1996). A text book of Medical Mycology. 1st edition. Interprint, New Delhi.
5. Chatterjee K.D (2016). Parasitology, Protozoology& Helminthology. 13th edition. Joe media Publishers. Calcutta.

OER:

1. http://www.gutenberg.org/
2. http://www.free-ebooks.net/
3. http://www.bookrix.com
4. http://www.e-booksdirectory.com/
5. http://bookboon.com/
6. http://www.freebooks.com/ebooks/

PIMBC20: IEC –III: HAEMATOLOGY AND BLOOD BANKING

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/ W	Credits	Marks
SEM: II	PIMBC20	Haematology and blood banking	Theory	Independent elective	-	2	100

Course Objective: To acquaint students with a clear background on haematology and blood banking procedures

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Outline the ABO blood grouping and Rh typing.

CO2: Apply techniques to collect and store blood samples.

CO3: Describe the composition of blood and discuss on various blood disorders.

CO4: Perform routine haematological tests.

CO5: Elaborate the clinical significance of blood transfusion.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	L	H	H	M	H	H
CO2	L	H	H	M	H	H
CO3	L	L	M	M	M	H
CO4	M	H	H	H	M	H
CO5	M	H	H	H	M	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	H	M	L	H
CO2	H	H	H	M	L	H
CO3	H	L	M	M	L	H
CO4	H	H	H	H	L	H
CO5	H	H	H	H	L	H

H – HIGH (3)
M – MODERATE (2)
L – LOW (1)

COURSE SYLLABUS

UNIT- I: ABO blood grouping and collection of blood samples

1.1 ABO blood grouping and Rh typing. (K1,K2)

1.2 Blood - Specimen collection. (K1,K2,K3)

1.3 Laboratory preparation in Haematology – Veinpuncture method (K1,K2,K3)

1.4 capillary method and finger prick method of blood sample collection (K1,K2,K3)

1.5 Anticoagulants. (K1,K2,K3)

1.6 Storage of blood specimen. (K1,K2,K3)

UNIT -II: Composition of blood

2.1 Composition of blood- cellular fraction. (K1,K2)

2.2 Composition of blood- plasma fraction. (K1,K2)

2.3 Morphological study of RBC. (K1,K2,K3)

2.4 WBC- Granulocytes -Neutrophiles, Eosinophils, Basophils (K1,K2,K3)

2.5 Non granulocytes- lymphocytes, monocytes. (K1,K2,K3)

2.6 Platelet and its significance. (K1,K2,K3)

UNIT- III: Blood disorders

3.1 Blood Disorder- Leukemia. (K1,K2,K3,K4)

3.2 Anaemia- its causes. (K1,K2,K3,K4)

3.3 Leucopaenia- its causes. (K1,K2,K3,K4)

3.4 Eosinophilia- its causes. (K1,K2,K3,K4)

3.5 Thrombocytopaenia - its causes (K1,K2,K3,K4)

3.6 Haematology - Normal values. (K1,K2,K3,K4)

UNIT- IV: Routine Haematological test

4.1 Intoduction to Routine Haematological tests. (K2,K3,K4,K5)

4.2 Haemocytometer -WBC counting. (K2,K3,K4,K5)

4.3 Haemocytometer- RBC counting. (K2,K3,K4,K5)

4.4 Buffy coat (determination of Haematocrit). (K2,K3,K4,K5)

4.5 Determination of erythrocyte sedimentation rate. (K2,K3,K4,K5)

4.6 Differential count of leucocytes. (K2,K3,K4,K5)

UNIT- V: clinical significance of blood transfusion.

5.1 Clinical significance of blood transfusion. (K1,K2)

5.2 Collection of blood for transfusion. (K1,K2,K3)

5.3 Processing of blood for transfusion. (K1,K2,K3)

5.4 Routine laboratory procedure in Blood bank. (K1,K2)

5.5 Transfusion reaction. (K1,K2)

5.6 Haemolytic disease of new born. (K1,K2)

REFERENCE BOOKS:

1. Maiti. C.R . 2002. "A Concise note on Medical laboratory technology" – New central book agency:Page 1-49.
2. Kanai. L. Mukherjee. 1988. "Medical Laboratory technology"- Volume I – Tata McGraw Hill.

OER:

1. http://www.gutenberg.org/
2. http://www.free-ebooks.net/
3. http://www.bookrix.com
4. http://www.e-booksdirectory.com/
5. http://bookboon.com/
6. http://www.freebooks.com/ebooks/

PIMBF20: IEC-VI: CYANOBACTERIOLOGY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/ W	Credits	Marks
SEM: III	PIMBF20	Cyanobacteriology	Theory	Independent elective	-	2	100

Course Objective: To provide an understanding on the structure, genomics, molecular regulation and applications of Cyanobacteria.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Outline the diversity of cyanobacteria.

CO2: Discuss on the genomics of Cyanobacteria.

CO3: Explain the molecular biology of Cyanobacteria.

CO4: Demonstrate molecular regulation of Cyanobacteria.

CO5: Comprehend the mass cultivation and applications of Cyanobacteria.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	M	M	M	H
CO2	H	H	H	L	L	M
CO3	H	M	M	H	L	M
CO4	H	M	H	H	M	M
CO5	H	H	M	M	H	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	H	H	L	H
CO2	H	M	H	M	L	H
CO3	H	M	H	M	L	H
CO4	H	M	H	M	L	H
CO5	H	H	H	H	H	H

H – HIGH (3)
M – MODERATE (2)
L – LOW (1)

COURSE SYLLABUS

UNIT-I: Introduction to cyanobacteria

1.1 Overview on cyanobacteriology. (K1,K2)

1.2 Introduction: Origins of life. (K1,K2)

1.3 Photosynthesis in cyanobacteria. (K1,K2)

1.4 Diversity of cyanobacteria. (K1,K2)

1.5 Fossil history of cyanobacteria. (K1,K2)

1.6 The Oceanic Cyanobacterial Picoplankton. (K1,K2)

UNIT-II: Genomics of Cyanobacteria

1.1 Gene transfer in cyanobacteria in nature. (K1,K2)

1.2 Gene transfer to cyanobacteria in lab. (K1,K2,K3)

1.3 Molecular ecology of Cyanobacteria. (K1,K2)

1.4 Environmental genomics of cyanobacteria. (K1,K2)

1.5 Comparative genomics of marine cyanobacteria. (K1,K2)

1.6 Stress response-regulatory system and regulated genes. (K1,K2)

UNIT-III: Molecular Biology of Cyanobacteria

3.1 Molecular Biology of Cyanelles and Chloroplast Origins and Evolution. (K1,K2)

3.2 Supramolecular Membrane Organization. (K1,K2)

3.3 Phycobilisome and Phycobiliprotein Structures. (K1,K2)

3.4 The Use of Cyanobacteria in the Study of the Structure and Function of Photosystem II. (K1,K2)

3.5 The Cytochrome Complex. (K1,K2)

3.6 Photosystem I in Cyanobacteria. (K1,K2)

UNIT-IV: Biochemistry and molecular regulation in cyanobacteria

4.1 The Biochemistry of cyanobacteria. (K1,K2)

4.2 Molecular Regulation of Carbon Dioxide Metabolism in Cyanobacteria. (K1,K2)

4.3 Genetic Analysis of Cyanobacteria. (K1,K2)

4.4 Heterocyst development. (K1,K2)

4.5 Heterocyst Metabolism. (K1,K2)

4.6 Differentiation of Hormogonia. (K1,K2)

UNIT-V: Applications of Cyanobacteria

5.1 Mass cultivation of cyanobacteria under outdoor and indoor conditions. (K1,K2)

5.2 Cyanobacteria as a source of fine chemicals: polysaccharides and bioactive molecules. (K1,K2,K3)

5.3 Cyanobacteria as a source of pigments and antioxidants. (K1,K2,K3)

5.4 Cyanobacteria as a source of lipids and polyunsaturated fatty acids. (K1,K2,K3)

5.5 Cyanobacteria as biofertilizer for paddy cultivation. (K1,K2,K3)

5.6 Hydrogen production by cyanobacteria: Mechanism, progress and prospects. (K1,K2)

TEXT BOOKS:

1. Samit Ray. (2006). Cyanobacteria. 1st edition. New Age International Pvt Ltd Publishers.
2. Percy M. Gault and Harris J. Marler. (2009) .Handbook on Cyanobacteria: Biochemistry, Biotechnology and Applications (Bacteriology Research Developments), Nova Science publishers, Inc.

REFERENCE BOOKS:

1. Antonia Herrero and Enrique Flores. (2008). The Cyanobacteria: Molecular Biology, Genomics and Evolution, Caister academic press.
2. T. A. Sarma. .(2012) Handbook of Cyanobacteria, CRC press.
3. D.A. Bryant. (1995). The Molecular Biology of Cyanobacteria (Advances in Photosynthesis and Respiration) Springer.

OER:

DIGITAL LIBRARIES:

1. http://www.loc.gov/
2. http://library.clark.edu/
3. http://www.dli.ernet.in/
4. http://www.loc.gov/education/

PCMBM20 : BIOETHICS AND BIOSAFETY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: IV	PCMBM20	Bioethics and Biosafety	Theory	Core	6	4	100

Course Objective: To provide the learners knowledge about biosafety concerns at the level of individuals, institution, society, region, country and the world.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Outline the principles of bioethics and explain the biosafety concerns with safeguard measures.

CO2: Compile the BSA statement for the industrial production of pharmaceuticals.

CO3: Adapt the WHO quality standards in food process technology.

CO4: Discuss on the global scenario of patenting.

CO5: Comprehend the forms of patents, patentability and process of patenting.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	M	M	M	H
CO2	H	H	M	L	L	H
CO3	H	M	L	H	M	H
CO4	H	M	L	H	M	H
CO5	H	H	M	M	H	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	H	L	H	H
CO2	H	H	H	M	L	H
CO3	H	H	H	L	M	H
CO4	H	M	H	L	M	H
CO5	H	H	H	L	H	H

H – HIGH (3)
M – MODERATE (2)
L – LOW (1)

COURSE SYLLABUS

UNIT-I : Principles of Bioethics. (15 hours)

1.1 Definition- Bioethics. (K1,K2)

1.2 Legality, morality and ethics- An introduction (K1,K2)

1.3 Intoduction to the principles of Bioethics. . (K1,K2)

1.4 Principles of autonomy. . (K1,K2)

1.5 Human rights. . (K1,K2)

1.6 Beneficence and privacy justice equality. . (K1,K2)

UNIT-II : Biosafety concerns. (15 hours)

2.1 Introduction to Biosafety. . (K1,K2)

2.2 Concept and issues of Biosafety. . (K1,K2)

2.3 Rational Vs subjective perceptions of risks and benefits. . (K1,K2)

2.4 Relationship between risk hazard, exposure, and safe guard. . (K1,K2)

2.5 Biosafety concerns at the level of individuals, institutions, society, region, country and the world. . (K1,K2,K3)

2.6 Lab associated infections. . (K1,K2,K4)

UNIT-III: Statement of Ethical practice (15 hours)

3.1 Introduction to BSA. . (K1,K2)

3.2 History of BSA . . (K1,K2)

3.3 British Sociological Association (BSA) statement of ethical practices of biotechnology in the production of pharmaceutical products. . (K1,K2)

3.4 BSA statement ethical practices of biotechnology in the production of drugs. . (K1,K2,K3)

3.5 BSA statement ethical practices of biotechnology in the production vaccines . (K1,K2,K3)

3.6 BSA statement ethical practices of biotechnology in the production biomolecules. (K1,K2,K3)

UNIT-IV: WHO quality standards. (15 hours)

4.1 Introduction to WHO and its functions. (K1,K2)

4.2 WHO standards – Quality control. (K1,K2,K3)

4.3 Quality control in food process technology. (K1,K2,K3,K4,K5)

4.4 Quality control in dairy product technology. (K1,K2,K3,K4,K5)

4.5 Quality control for potable water. (K1,K2,K3,K4,K5)

4.6 Quality control measures in pharmaceutical industries. (K1,K2,K3,K4,K5)

UNIT-V : IPR and Patenting. (15 hours)

5.1 Introduction to IPR and Patenting. (K1,K2)

5.2 GATT and IPR, forms of IPR, IPR in India, WTO Act. (K1,K2,K3,K4,K5)

5.3 Convention on Biodiversity (CBD), Patent Co-operation Treaty (PCT). (K1,K2,K3,K4,K5)

5.4 Forms of patents and patentability, process of Patenting. (K1,K2,K3,K4,K5)

5.5 Indian and international agencies involved in IPR & patenting. (K1,K2,K3,K4,K5)

5.6 Global scenario of patents and India's position, patenting of biological material, GLP, GMP. (K1,K2,K3,K4,K5)

TEXT BOOKS:

1. Frederic H. Erbisch, Karim M. Maredia (2004). Intellectual Property Rights in Agricultural Biotechnology, CABI Publisher.
2. John Bryant (2002) Bioethics for Scientists. John Wiley and Sons Publisher.

REFERENCES BOOKS:

1. Mittal D.P. (1999). Indian Patents Law. Taxmann Allied Services (p) Ltd.
2. Christian Lenk, Nils Hoppe, Roberto Andorno (2007). Ethics and Law of Intellectual Property: Current Problems in Politics, Science and Technology, Ashgate Publisher (p) Ltd.
3. Felix Thiele, Richard E. Ashcroft (2005). Bioethics in a Small World. Springer.

OER:

DIGITAL LIBRARIES:

1. http://www.loc.gov/
2. http://library.clark.edu/
3. http://www.dli.ernet.in/
4. http://www.loc.gov/education/