

**KU2DSCMBG104- PERSPECTIVES OF MICROBIOLOGY**

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
II	DSC A2	100-199	KU2DSCMBG104	4	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

**Course Description:**

This course offers a comprehensive exploration of the methods employed to manage microbial growth, cultivate diverse microorganisms & preserve their viability. From understanding different culture media and growth conditions to employing aseptic techniques, students will gain skills in isolating and propagating bacteria, viruses, fungi and algae. Students will also learn about culture preservation techniques ranging from routine periodic transfer techniques employed in the laboratory to more advanced preservation techniques like cryopreservation, lyophilization and other techniques used to maintain the stability of microbial strains ensuring their availability for future studies.

**Course Prerequisite:** Basic knowledge in Microbiology gained during +2 level and first semester of this programme

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Understand the principle and methods for controlling microorganisms and apply this knowledge in controlling microbes in day today life.	U/A
2	Understand and familiarize various culture media and components for cultivation of different microorganisms	U
3	Utilize various culture methods for the isolation and cultivation pure cultures and for the enumeration of microbial cells.	A
4	Understand and apply the various methods for the short term and long-term preservation of microbial cultures.	U/A

**\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)**

### Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO 1	✓	✓		✓				
CO 2		✓			✓			✓
CO 3		✓	✓					
CO 4		✓	✓			✓		✓

### COURSE CONTENTS

#### Contents for Classroom Transaction:

<b>M O D U L E</b>	<b>U N I T</b>	<b>DESCRIPTION</b>	<b>HOURS</b>
<b>1</b>	<b>Control of microorganisms</b>		<b>15</b>
	1	Fundamentals of microbial control – Definition – sterilization, disinfection, Antisepsis, Sanitization, Microbistatic and microbicidal agents	
	2	Factors influencing the effectiveness of antimicrobial agents.	
	3	Physical agents of microbial control – Heat – TDP, TDT, D-value, Z-value, F-value, Moist heat and dry heat – Autoclave, Pasteurization, Tyndallisation, Inspissation, Incineration, Hot air oven. Filtration and Irradiation (Ionizing and non-ionizing).	
	4	Chemical antimicrobial agents – Phenolics, alcohols, halogens, heavy metals, quaternary ammonium compounds, aldehydes, sterilizing gases, characteristics of an ideal chemical agent, evaluation of antimicrobial potency of disinfectants- phenol coefficient – Rideal Walker and Chick Martin tests. Antibiotics – classes with example and mode of action, antimicrobial resistance mechanisms in brief	

<b>Media and components</b>		<b>10</b>
<b>2</b>	1	Culture media – major components- agar, peptone, beef extract, yeast extract.
	2	Solid, semi solid and liquid cultures - Types of media – defined, basal, complex, enriched, enrichment, selective, indicator, differential, transport and anaerobic culture media
	3	Media for the cultivation of bacteria, fungi, algae and protozoans – examples
	4	Cultivation of viruses – brief account.

<b>Culture methods</b>		<b>15</b>
<b>3</b>	1	Pure culture- definition, culture methods – streak plate, spread plate, pour plate, lawn culture, stroke culture, stab culture, liquid cultures.
	2	Anaerobic culture methods – anaerobic jar, roll tube, Rosenthal method.
	3	Enumeration of microbial cells – CFU.
	4	Fungal culture – Slide culture

<b>Practicals in basic microbiology</b>		<b>30</b>
<b>4</b>	1	Demonstration of the most common laboratory equipment used in microbiology practical- Autoclave, Hot air oven, Laminar airflow, Bacteriological incubator, Colony counter, etc. Sterilization by autoclave and hot air oven
	2	Culture media preparation - Broth and agar- Nutrient broth, nutrient agar, Special media - Mac Conkey agar, Mannitol Salt agar, Blood agar and Mueller Hinton agar, Fungal media- SDA/PDA/MRBA
	3	Culture methods – Streak plate, pour plate and spread plate methods Isolation and enumeration of viable bacteria (CFU) from various samples (soil / water / fruits / vegetables)
	4	Demonstration of fungal cultures - Slide culture technique

5	<b>Teacher Specific Module</b>	<b>5</b>
	<i>Directions</i>	
	Activity	

#### Essential Readings:

1. Michael J Pelczar, JR., E C S Chan, Noel R Krieg; Microbiology; 5<sup>th</sup> edition.
2. Joanne Willey, Kathleen Sandman, Dorothy Wood; Prescott's Microbiology; Eleventh edition; Mc Graw Hill publishers.
3. Ananthanarayan, C K Jayaram Paniker; Textbook of Microbiology; 8<sup>th</sup> edition
4. Jacquelyn G Black, Laura J Black; Microbiology- Principle and Explorations; 9<sup>th</sup> edition; Wiley publishers.
5. Gerald J Tortora, Berdell R Funke, Christine L Case; Microbiology- An Introduction; Ninth edition; Pearson publishers.

#### Suggested Readings:

1. Michael J Pelczar, JR., E C S Chan, Noel R Krieg; Microbiology; 5<sup>th</sup> edition.
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**Assessment Rubrics:****Theory**

<b>Evaluation Type</b>		<b>Marks</b>
End Semester Evaluation L		<b>50</b>
Continuous Evaluation L		<b>25</b>
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
<b>Total L</b>		<b>75</b>

Any components from the above table can be taken for CE not exceeding 25 Marks

**Practicals**

<b>Evaluation Type</b>		<b>Marks</b>
End Semester Evaluation P		<b>15</b>
Continuous Evaluation P		<b>10</b>
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
<b>Total</b>		<b>25</b>

Any components from the above table can be taken for CE not exceeding 10 Marks