

## PG MICROBIOLOGY

### PEMBB20: ECONOMIC MICROBIOLOGY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: I	PEMBB20	Economic Microbiology	Theory	Core Elective	3	3	100

**Course Objective:** To introduce entrepreneurial skills among students to become entrepreneurs and can decide to make the idea reality.

#### Course Outcomes (CO):

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

**CO1:** Utilize microorganisms as biofertilizers and for vermicomposting.

**CO2:** Analyse microbial cells as fermented products.

**CO3:** Use yeast in and as food and feed.

**CO4:** Demonstrate mushroom cultivation and its storage.

**CO5:** Discuss biotechnological applications of microalgae.

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

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

**H – HIGH (3)**

**M – MODERATE (2)**

**L – LOW (1)**

## COURSE SYLLABUS

### Unit-I: **Microbes in Agriculture.** (8 hours)

- 1.1 Production and application of biofertilizers - *Rhizobium*, *Azospirillum*, *Azotobacter*. (K1,K2,K3,K4)
- 1.2 *Azolla* - *Anabaena*, BGA. (K1,K2,K3,K4)
- 1.3 Phosphate solubilizing – phosphobacterium and Mycorrhiza. (K1,K2,K3,K4)
- 1.4 Bacterial Biopesticides. (K1,K2,K3,K4)
- 1.5 Fungal Biopesticides. (K1,K2,K3,K4)
- 1.6 Role of microorganisms in vermicomposting. (K1,K2,K3,K4)

### UNIT-II: **Microbes in Industries.** (10 hours)

- 2.1 Fermented beverages: wine, beer, whisky, brandy – health benefits and disadvantages. (K1,K2,K3,K4)
- 2.2 Organic acids- Citric acid, acetic acid. (K1,K2,K3,K4)
- 2.3 Organic solvents- Acetone, butanol, ethanol. (K1,K2,K3,K4)
- 2.4 Fermented foods- cheese, yoghurt, sauerkraut, bread, sweeteners, flavor enhancers. (K1,K2,K3,K4)
- 2.5 Traditional fermented foods- Dhokla, Appam, Churpa/Churpi, fermented bamboo shoot. (K1,K2,K3,K4,K5,K6)
- 2.6 Oriental fermented foods- soya sauce, koji & miso(K1,K2,K3,K4).

### UNIT-III: **Yeast Production.** (9 hours)

- 3.1 Bottom and Top yeast- Baker's yeast. (K1,K2)
- 3.2 Food and feed yeasts. (K1,K2)
- 3.3 Alcohol yeasts. (K1,K2)
- 3.4 SCP: *Saccharomyces cerevisiae*, *Pichia pastoris*. (K1,K2)
- 3.5 *Candida utilis* and *Geotrichum candidum*. (K1,K2)
- 3.6 Other yeast products. (K1,K2)

### UNIT-IV: **Mushroom Cultivation.** (9 hours)

- 4.1 Button mushroom (*Agaricus bisporus*) – composting, spawning (K1,K2,K3,K4,K6)
- 4.2 Button mushroom (*Agaricus bisporus*) – cropping, harvesting and marketing. (K1,K2,K3,K4,K6)
- 4.3 Oyster mushroom (*Pleurotus* sps.), - composting, spawning (K1,K2,K3,K4,K6)
- 4.4 Oyster mushroom (*Pleurotus* sps.), - cropping, harvesting and marketing (K1,K2,K3,K4,K6)
- 4.5 Paddy straw mushroom (*Volvariella volvacea*) – composting, spawning. (K1,K2,K3,K4,K6)
- 4.6 Paddy straw mushroom (*Volvariella volvacea*). cropping, harvesting and marketing. (K1,K2,K3,K4,K6)

**UNIT–V: Microalgal Technology. (9 hours)**

- 5.1 Cultivation methods of Spirulina (K1,K2,K3,K4,K6)
- 5.2 Biotechnological potentials of microalgae- food and feed. (K1,K2)
- 5.3 Fuel production from microalgae- Methane and Hydrocarbon. (K1,K2,K3,K4)
- 5.4 Pharmaceutically valuable compounds from microalgae (K1,K2,K3,K4)
- 5.5 Food and nutraceuticals of Algae: Cyanophyta, Rhodophyta, Heterokontophyta, Chlorophyta. (K1,K2,K3,K4)
- 5.6 Polysaccharides (Agar Agar, Carageenan and Alginic acid). (K1,K2,K3)

**TEXT BOOKS:**

1. Dubey R.C (2005). A Text of Biotechnology. Multicolour Illustrative edition, S.Chand and Company Ltd., New Delhi.
2. Subba Rao NS (2004). Soil Microbiology. 4<sup>th</sup> edition, Oxford and BH Publishing Co.Pvt. Ltd., New Delhi.
3. Patel A.H (2001). Industrial Microbiology. 3<sup>rd</sup> edition, Mac Millan India ltd, Chennai.
4. Ismail S.A (2005). The Earthworm Book, 2<sup>nd</sup> revised edition. Other India Press, Goa, India.
5. Vijaya Ramesh K (2007). Food Microbiology. 1<sup>st</sup> edition, MJP Publishers, Chennai.

**REFERENCE BOOKS:**

1. Casida J.E (1986). Industrial Microbiology, 1<sup>st</sup> edition. Wiley Eastern publishers.UK.
2. Frazier W.C. and West Hoff D.C (2008). Food Microbiology. 4<sup>th</sup> edition. Mc Graw Hill, New York.
3. Suman B.C and Sharma V.P (2005) Mushroom Cultivation, Processing and Uses. 1<sup>st</sup> edition, Agribios (India) Publishers, Jodhpur.
4. Lansing M. Prescott, John P. Harley., Donald A. Klein (2011) .Microbiology.8<sup>th</sup> edition. McGraw Hill Inc., New York.
5. McCandless, E.L. 1981. Polysaccharides of seaweeds. In The Biology of seaweeds, ed. C.S. Lobban and M.J. Wynne, pp. 559-88. Blackwell, Oxford.
6. Melanie N. Johansen. 2011. Microalgae\_ Biotechnology, Microbiology and Energy (Marine Biology) --Nova Science Pub Inc
7. Tridevi, P. C. 2001. Algal Biotechnology. Point Publisher, Jaipur, India

**OER:**

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

**PIMBE20: IEC-V: ENTREPRENEURSHIP AND MANAGEMENT IN MICROBIAL TECHNOLOGY**

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/ W	Credits	Marks
<b>SEM: III</b>	<b>PIMBE20</b>	<b>Entrepreneurship and Management in Microbial Technology</b>	<b>Theory</b>	<b>Independent elective</b>	<b>-</b>	<b>2</b>	<b>100</b>

**Course Objective:** To provide an understanding on the concepts of entrepreneurship such as Planning, decision making, leadership, organizations and authority and to provide idea on the basic requirements for establishing a bio-based start-up programme.

**Course Outcomes (CO):**

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

**CO1:** Acquaint basic concepts of management such as planning, decision making, leadership, organization and authority.

**CO2:** Compile the motivational theories.

**CO3:** Explain the concepts of centralization and decentralization.

**CO4:** Discuss on IPR and Bioethics with an understanding of government policies.

**CO5:** Attain skill to manage start up and run an organization.

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

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

**H – HIGH (3)**

**M – MODERATE (2)**

**L – LOW (1)**

## **COURSE SYLLABUS**

### **UNIT -I : Understanding management and administration.**

- 1.1 Understanding management and administration. (K1,K2)
- 1.2 Management: Nature and scope. (K1,K2)
- 1.3 Management: functional aspects/areas. (K1,K2)
- 1.1 Evolution of management thought: early, contemporary and modern. (K1,K2)
- 1.2 Roles of Management. (K1,K2)
- 1.3 Levels of managements. (K1,K2)

### **UNIT-II: Major components of management skills.**

- 2.1 Major component of management skills. (K1,K2,K3)
- 2.2 Planning: nature, purpose and importance. (K1,K2,K3)
- 2.3 Types of plans. (K1,K2,K3,K4,K5,K6)
- 2.4 Steps in planning & planning premises. (K1,K2,K3,K4,K5,K6)
- 2.5 Hierarchy of plans. (K1,K2,K3,K4,K5,K6)
- 2.6 Components of planning, Decision making. (K1,K2,K3,K4,K5,K6)

### **UNIT- III : Motivational theories**

- 3.1 Leadership Meaning and nature of directing. (K1,K2,K3)
- 3.2 Understanding, Supervision, motivation . (K1,K2,K3)
- 3.3 Leadership styles, Motivation Theories (Abraham Maslo, Herzberg and Victor Hvrom's).  
(K1,K2)
- 3.4 Communication – Meaning and importance. (K1,K2,K3)
- 3.5 Meaning and steps in controlling – Essentials of a control system. (K1,K2,K3)
- 3.6 Methods of establishing control (in brief). (K1, K2,K3)

### **UNIT-IV: Centralization Vs Decentralization**

- 4.1 Centralization Vs Decentralization of authority and responsibility. (K1,K2)
- 4.2 Nature and importance of staffing–Process of Recruitment and Selection. (K1,K2,K3)
- 4.3 Organisation: nature and purpose. (K1,K2,K3)
- 4.4 Principles of organization. (K1,K2,K3)
- 4.5 Types of organization. (K1,K2,K3)
- 4.6 Departmental Committees. (K1,K2,K3,K4,K5,K6)

**UNIT-V: Structure of biobased technology company.**

5.1 Structure of a Bio based technology Company. (K1,K2,K3)

5.2 Start-up of Bio based technology Company. (K1,K2,K3,K4,K5,K6)

5.3 New Product Development. (K1,K2,K3,K4,K5,K6)

5.4 Market Research. (K1,K2,K3,K4,K5,K6)

5.5 Capital and source investors. (K1,K2,K3,K4,K5, K6)

5.6 Sales & Marketing Principles. (K1,K2,K3, K4, K5)

**TEXT BOOKS:**

1. Naidu, NVR. (2013) Management and Entrepreneurship . 1<sup>st</sup> edn. I. K. International Pvt Ltd
2. Tripathi, PC., Reddy, PN. (2008) Principles of Management — Tata McGraw Hill,

**REFERENCE BOOKS:**

1. Desai V. (2004) .Dynamics of Entrepreneurial Development & Management– Vasant Desai – Himalaya Publishing House
2. Charantimath , PM. (2006) Entrepreneurship Development Pearson Education – 2006
3. Thomson Robbins, S. (2003) Entrepreneurship Development– 17th Edition - Pearson Education/PHI

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