ST. ALOYSIUS COLLEGE (AUTONOMOUS), JABALPUR

Reaccredited 'A+ 'Grade by NAAC (CGPA:3.68/4.00)
College with Potential for Excellence by UGC
DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Master of Science (M.Sc.)

SUBJECT: MICROBIOLOGY

M.Sc. II Semester

Paper-IV

Elective

Microbial Metabolism

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
On completion of this course, the learners -		
CO 1	Students will be able to understand the basic knowledge of metabolic pathways, their diversity, specific regulation, and their interrelation in different cells.	U
CO 2	Students will be able to learn about synthesis of certain microbial products of economic importance.	U
CO 3	Learners will be able to explain the transport of different metabolites generated, with application in industrial processes.	U
CO 4	Students will be able to gain practical knowledge for analysing effect of different environmental factors on microbial growth.	U, A

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	10	40 (Minimum Passing marks 13)	**50**
Practical	2	5	20	**25**
Total	**6**	**75**		

Evaluation Scheme

	Marks	
	Internal	External
Theory	1 Internal Exams of 10 Marks	1 External Exams (At the End of Semester)
Practical	Continuous Evaluation (5 marks)	1 External Exams (At the End of Semester)

Content of the Course

Theory

No. of Lectures (in hours per week): 5 Hrs. per week
Total No. of Lectures: 60 Hrs.

Maximum Marks: 40

Units	Topics	No. of Lectures
I	Microbial growth: mathematical expression of growth, growth measurement, efficient growth curve, synchronous growth and continuous culture, effect of environmental factors on microbial growth, nutrients diffusion, active transport, group translocation, solutes, temperature, oxygen relations.	10
II	Chaemolithotrophy: Sulphur, iron, hydrogen, carbon monoxide, nitrogen oxidations. Methanogenesis, luminescence. Brief account of photosynthetic and accessory pigments chlorophyll, bacteriochlorophyll, carotenoids, oxygenic, anoxygenic photosynthesis. Electron transport- photoautotrophic generation of ATP, fixation of CO2- Calvin cycle, reverse TCA, carbohydrate anabolism.	15
III	Respiratory metabolism: Embden Mayer Hoff pathway, Entner Doudroff pathway, glyoxalate pathway, Krebs cycle, oxidative and substrate level phosphorylation, Pasteur effect, fermentation of carbohydrates-homo and heterolactic fermentations. Synthesis of polysaccharides- gluconeogenesis and other pathways.	15
IV	Assimilation of nitrogen: Dinitrogen - nitrate nitrogen-ammonia- denitrification, synthesis of major amino-acids, polyamines; peptidoglycan-biopolymers as cell components.	10
V	Microbial development, sporulation and morphogenesis, hyphae vs. yeast forms and their significance. Multicellular organization of selected microbes. Dormancy. Endospore-structure, properties, and germination.	10

List of Recommended Books:

1. Doelle H.W. 1969. Bacterial Metabolism. Academic Press.
2. Gottschalk G. 1979. Bacterial Metabolism. Springer Verlag. Moat AG. 1979. Microbial Physiology. John Wiley & Sons.
3. Sokatch JR. 1969. Bacterial Physiology and Metabolism. Academic Press.
4. Moat A G., Foster J W., Spector M P. Microbial Physiology, 4th Ed: Wiley India Pvt Ltd 2009