FACULTY OF SCIENCE

M.Sc. (Microbiology) (Semester-4)

In Effect from Academic Year 2017-18

Subject Code: 1SC2020403	**Subject Title: MICROBIAL PHYSIOLOGY**
COURSE TYPE: CORE COURSE	

Course Objective: The main aspect of this paper includes Inorganic metabolism of nitrogen and sulfur, electron transport, C1 metabolism and Photosynthesis in prokaryotes. It also includes Carbon dioxide fixation systems, Cell wall and capsule biosynthesis.

Teaching scheme (hours) per week		**Credit**			**Theory Marks**		**Practical Marks**		**Total**
Theory	**Practical**	**Theory**	**Practical**	**Total**	**Uni. Assessment**	**Cont. Assessment**	**Uni. Assessment**	**Cont. Assessment**	
4	**--**	**4**	**--**	**4**	**60**	**40**	**--**	**--**	**100**

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Unit	Content	Lectures	Weightage
1	**UNIT-1: Nitrogen and Sulfur Metabolism:** ✓***Biological Nitrogen fixation:*** The Nitrogen Fixation process , Symbiotic Nitrogen Fixation, Inorganic Nitrogen Metabolism, Assimilation of Inorganic Nitrogen, Regulation of Nitrogen fixation ✓***General Reactions of Amino Acids:*** Amino Acid Decarboxylases, Amino Acid Deaminases, Amino Acid Transaminases (Aminotransferases), Amino Acid Racemases, Role of pyridoxal-5'-Phosphate in Enzymatic Reactions with Amino Acids, The Stickland Reaction ✓***Sulfur Metabolism:*** Sulfate assimilation, Sulfide formation and sulphide consumption by bacteria, Dissilmilatory sulfate reduction, Microbial sulphur oxidation.	**15**	**25%**
2	**UNIT- 2: Energy Production:** ✓Membrane bioenergetics: the proton potential, Electron transport chain and its components ✓Metabolism of substrates other than glucose, Catabolism of Aliphatic hydrocarbons, Growth on C1 compounds other than CO2: The methylotrophs, Energy efficiency in C1 metabolism, Chemolithotrophic bacteria	**15**	**25%**
3	**UNIT-3: Photosynthesis:** ✓The phototrophic prokaryotes: The purple photosynthetic bacteria, The green sulfur bacteria, Cyanobacteria and chloroplast, Efficiency of photosynthesis ✓Photosynthetic pigments ✓Light harvesting Antennas ✓Structures of Chlorophylls, bacteriochlorophylls and carotenoids ✓The transfer of energy from light harvesting pigments to the reaction centre ✓ The structure of photosynthetic membranes in bacteria	**15**	**25%**
4	**UNIT-4: Biosynthesis:** ✓Carbon dioxide fixations systems ✓Cell wall and capsule biosynthesis ✓Biosynthesis of Nucleic Acids ✓Biosynthesis of Phosphoglycerides	**15**	**25%**

Learning Outcome: Students by offering this course will make themselves aware of different physiological processes operated at the level of prokaryotic cells, such as production of energy, photosynthetic activity, biosynthesis of different vital biomolecules and metabolic approach of prokaryotic cells for nitrogen and sulfur elements.

Reference Books:

1. The Physiology and Biochemistry of Prokaryotes, 2nd Edition, David White, Oxford University Press 2003, ISBN: 0-19-512579-7
2. Microbial Physiology, 4th Edition, 2009, Albert G. Moat, John W. Foster, Michael P. Spector, Wiley, ISBN: 978-81-265-2106-7
3. Rutger de Wit., Sulfide-Containing environments, Encyclopedia of Microbiology Vol-.4, 2ndEdition.Academic Press.
4. Byung Hong Kim and Geoffrey Michael Gadd. Bacterial Physiology and Metabolism, Cambridge University Press 2008, ISBN 13 978-0-511-39322-8. (e-book). ISBN 13 978-0- 521-84636-3 (hard back).