

**Core Course V (CC) - Microbial Physiology**

**Unit I : Cell structure and function**

Biosynthesis of peptidoglycan - outer membrane, teichoic acid – Exopolysaccharides; cytoplasmic membrane, pili, fimbriae, S-layer. Transport mechanisms – active, passive, facilitated diffusions – uni, sym, antiports. Electron carries – artificial electron donors – inhibitors – uncouplers – energy bond – phosphorylation.

**Unit II : Microbial growth**

Phases of growth curve – measurement of growth – calculations of growth rate – generation time – synchronous growth – induction of synchronous growth, synchrony index – factors affecting growth – pH, temperature, substrate and osmotic condition. Survival at extreme environments – starvation – adaptative mechanisms in thermophilic, alkalophilic, osmophilic and psychrophilic. Bioluminescence - mechanism – advantages.

**Unit III : Microbial pigments**

Autotrophs - cyanobacteria - photosynthetic bacteria and green algae – heterotrophs – bacteria, fungi, myxotrophs. Brief account of photosynthetic and accessory pigments – chlorophyll – fluorescences, phosphorescences - bacteriochlorophyll – rhodopsin – carotenoids – phycobiliproteins;

**Unit IV : Carbon assimilation**

Carbohydrates – anabolism – autotrophy – oxygenic – anoxygenic Photosynthesis – autotrophic generation of ATP; fixation of CO<sub>2</sub> – Calvin cycle – C3 – C4 pathways. Respiratory metabolism – Embden Mayer Hoff pathway – Enter Doudroff pathway – glyoxalate pathway – Krebs cycle – oxidative and substrate level phosphorylation – reverse TCA cycle – gluconeogenesis – Fermentation of carbohydrates – homo and heterolactic fermentations.

**Unit V : Spore structure - function**

Cell division – endospore – structure – properties – germination. Microbial development, sporulation and morphogenesis. Hyphae vs yeast forms and their significance. Multicellular organization of selected microbes. Dormancy.

**References:**

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