**Unit 1 – Cell Biology Learning Outcomes:**

1. **Cell Ultrastructure**

* Describe the ultrastructure of typical plant, animal, fungi and bacteria cells.
* State the functions of organelles found in typical plant, animal, fungi and bacteria cells.

1. **Transport across cell membranes**

* Describe the composition of the cell membrane and its permeability.
* Explain the characteristics of passive transport.
* Describe diffusion and its importance.
* Describe osmosis.
* Describe the effects of osmosis on plant and animal cells.
* Explain the characteristics of active transport.

1. **Producing New cells**

* State the meaning of the term diploid and the importance of maintaining a diploid chromosome complement after cell division.
* Describe the sequence of events of mitosis, including equator and spindle fibres.
* Describe the factors required for the production of cells by cell culture including aseptic techniques, an appropriate medium and control of other factors.

1. **DNA**

* Describe the structure of DNA.
* Explain the relationship between DNA and proteins.
* State the names of the four bases and that they make up the genetic code.
* Explain the relationship between the order of bases on DNA and the amino acids in a protein.
* Describe the role of mRNA in protein production.
* Give the simple structures proteins are made from and where they are assembled.

1. **Therapeutic Use of cells**

* Describe how genetic information can be transferred from one cell to another.
* Give details of the stages of genetic engineering.

1. **Enzymes**

* Explain how the variety of protein shapes and functions arises.
* Describe the functions of some proteins.
* State what enzymes are and where they can be found.
* Give the function of an enzyme.
* Explain the relationship between the active site of an enzyme and its substrate.
* Explain the meaning of the term optimum as applied to enzymes.
* • Give the factors which affect enzymes and other proteins and describe their effect.
* Explain the meaning of the term denaturation and explain why it happens.

1. **Respiration**

* Explain what is meant by the term respiration.
* Describe the production of ATP using energy from respiration.
* State the uses of ATP within a cell.
* Describe the chemistry of respiration with reference to the number of ATP produced.
* Give examples of cells with a high energy demand and number of mitochondria.
* Describe the fermentation pathway with reference to the number of ATP produced.
* Describe anaerobic respiration in animal cells.
* Describe anaerobic respiration in plant and yeast cells.
* Give the location of fermentation reactions within the cell.
* Give the location of aerobic respiration within the cell.
* Give the summary word equations for respiration.

1. **Photosynthesis**

* Describe the chemistry of photosynthesis as a series of enzyme-controlled reactions in a two stage process.
* Describe what happens during the light reactions.
* Describe what happens during carbon fixation.
* Give the summary word equation for photosynthesis.
* Give details of the fate of the sugar made during photosynthesis.
* Describe the limiting factors of photosynthesis and explain their impact on photosynthesis and cell growth.