

ANIMAL BIOTECHNOLOGY - SBM 5108

ASSIGNMENT ANSWERS SHEET

1. Viral vectors are tools commonly used by molecular biologists to deliver genetic materials into the cells. This process can be performed inside a living organism (in vivo) or in a cell culture (in vitro). State and explain FIVE key properties of a viral vector. (20 Marks)

- i.** Safety: Although viral vectors are occasionally created from pathogenic viruses, they are modified in such a way as to minimize the risk of handling them. This usually involves the deletion of a part of the viral genome critical for viral replication. Such a virus can efficiently infect cells but once the infection has taken place, they require a helper virus to provide the missing proteins for the production of new virions.
- ii.** Low toxicity: the viral vector should have a minimal effect on the physiology of the cell it infects.
- iii.** Stability: some viruses are genetically unstable and can rapidly rearrange their genomes. This is detrimental to predictability and reproducibility of the work conducted using a viral vector and is avoided in their design.
- iv.** Cell type specificity: Most viral vectors are engineered to infect as wide a range of cell types as possible. However, sometimes, the opposite is preferred. The viral receptor can be modified to target the virus to a specific kind of cell. Viruses modified in this manner are said to be pseudo-typed.
- v.** Identification: Viral vectors are often given certain genes that can help identify which cells took up the viral genes. These genes are called markers. A common marker is antibiotic resistance to a certain antibiotic. The cells can then be isolated easily as those that have not taken up the viral vector genes and do not have the antibiotic resistance and so cannot grow in a culture with antibiotics present.