The prediction of accurate outputs in many industrial applications, such as fault diagnostics, wind energy yield forecasting, and remaining usable life prediction, necessitates high dimensional inputs. Signal inputs are often absent owing to bad weather, resulting in the failure of network/sensors in offshore wind farm supervisory management and the process of sampling signals that measure real-world physical conditions and translating the resulting samples into digital numeric values. As a result, future diagnostic or prognostic tasks will be less accurate. Offshore wind farms (WFs) are time-varying systems, and typical learning approaches require high computing costs. Despite this, there exist several strategies for handling missing data. We frequently employ two learning models to solve this issue, one for each missing-data circumstance. We utilise a Spatio-temporal correlation approach for full feature-missing situations, and we employ a feature-correlation method for partial feature-missing conditions. (Sun, Chen, and Cheng 2021)

Q2 (a): How do you best handle the direction of the wind speeds? How do we choose the size of the sectors?

Ans:

The most widely used renewable energy source is wind power, maintaining a prominent position. A wind turbine (WT) system's efficiency and cost-effectiveness in a wind application rely heavily on its management and control, which is true for all renewable energy sources, including wind power. We have several control strategies linked with wind energy control. The direction of wind speeds must be controlled for maximum power output and sustained grid supply(Apata and Oyedokun 2020). The yaw drive interacts with the wind vane to determine the appropriate orientation of the turbine with the wind. Turbine nacelles are rotated by the yaw drive to maintain them face the wind when the direction of the wind changes. Using the yaw drive and yaw motors makes this possible ("How a Wind Turbine Works - Text Version | Department of Energy" n.d.).

Q2 (b): How much do the scaling factors vary by each sector? How do we choose the size of the sectors?

Individuals, businesses, schools, and communities, utilise wind energy, from huge, land-based utility-scale wind power installations to small and community distributed wind projects. Our team can divide the wind market sectors into two categories based on the scale: utility-scale projects and distributed wind projects ("WINDExchange: Wind Energy Market Sectors" n.d.). Utility-Scale Wind Market Sector Utility-scale turbines have a capacity of moreover 100 kilowatts. Utility-scale wind turbines are often found in multi-turbine wind farms that are connected to the country's transmission grid. A transmission infrastructure similar to that used by any other commercial power plant distributes the energy generated by these projects to a wide range of consumers. They are high-tech wind turbines that are extremely reliable and can produce electricity at a cost-competitive level at power plant scales. Utility-scale wind turbines Prices for wind power are now competitive with wholesale power and other new-generation sources in various parts of the country ("WINDExchange: Wind Energy Market Sectors" n.d.). Distributed Wind Market Sector Wind systems that vary from a single off-grid wind turbine producing less than one kilowatt (kW) to a small array of wind turbines producing several megawatts (MW) are included in the distributed wind market. A wide range of size options are available on the distributed wind market, ranging from small wind turbines on private land that generates less than one kilowatt (kW) of energy to multi-megawatt wind farms that provide electricity to schools, hospitals, and other major facilities. The turbines can produce all the electricity needed at a site or offer a portion of the electricity needed to offset utility expenditures at the location. A distributed wind project can comprise both community wind projects and small wind projects, as well as a combination of both ("WINDExchange: Wind Energy Market Sectors" n.d.). Community Wind Power Some community wind projects may appear to be normal land-based, utility-scale wind installations at first glance. Several midsize wind turbines can be connected to a single grid. The recipient of the energy, though, is where they differ. Community wind projects provide electricity to a local neighbourhood, but the energy does not enter the main utility transmission grid, even though many individuals share it in the community. One of the distinguishing features of a community wind project is that most of the project's benefits stay in the community ("WINDExchange: Wind Energy Market Sectors" n.d.). Residential Wind Energy, A single wind turbine on private land, might be a small wind plant. Residential distributed wind allows landowners to capture wind energy and utilise as much as they need to power their homes and other structures on their property. Distributed wind energy may either be used off-grid or connected to the grid by a landowner ("WINDExchange: Wind Energy Market Sectors" n.d.).