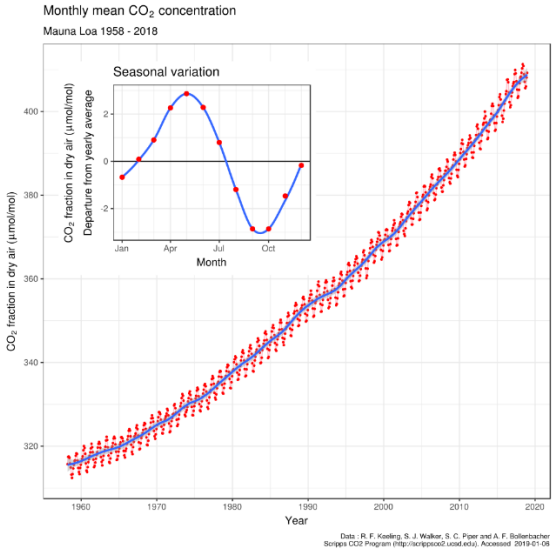
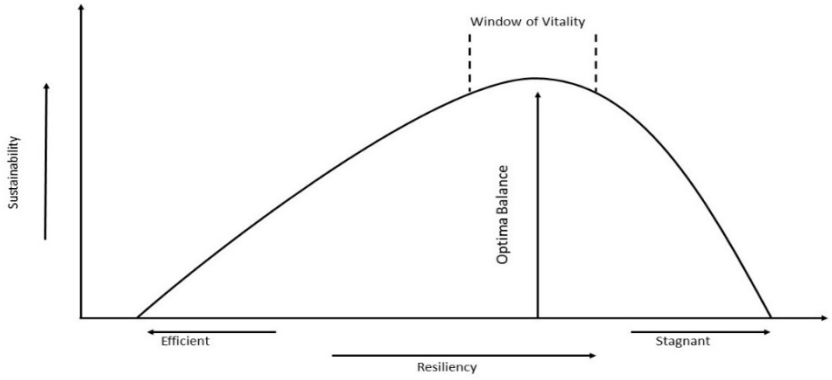
11	What are the three major breakthroughs of Keelings curve?  It has **three** major breakthroughs. **First**, that the CO2 conc. in the atmosphere is not a constant. It varies according to season. In the spring and summer seasons, trees grow leaves in the northern hemisphere which reduces the amount of CO2 in the atmosphere. In fall and winter seasons, these trees shed leaves and also lose their CO2, which causes a rise of CO2 in the atmosphere. **Second** breakthrough was that if you were draw a trend line through this graph, you would see a slight uptick. He roughly calculated this uptick is at the same rate of fossil fuel emissions in the world. **Third,** though the rate is the same, the total estimated quantity of CO2 increase in the atmosphere is not the same as the amount emitted in the atmosphere by fossil fuels. He conjectured that some of it was being absorbed by natural systems like forests and oceans (and hence not all of it was being absorbed back by earth systems).	2 3
12	List down advantages and disadvantages of various renewable energy sources? **Renewable Energy Source** / **Advantages** / **Disadvantages** Solar — Low running expenses, no emissions, and widespread availability — Sporadic, reliant on weather, and affected by land use Wind — Low running expenses, no emissions, and widespread availability — Intermittent, effects of land use, and possible effects on animals Biomass — Broadly accessible fuel that can be used for transit, electricity, and heating — Broadly accessible fuel that can be used for transit, electricity, and heating Geothermal — No emissions, great reliability, and the capacity to produce heat and energy simultaneously — Low supply and expensive initial expenses Wave — No emissions, steady source of electricity — Low technology growth and expensive initial expenses Vibration/ Kinetic — Numerous uses, possibly affordable — Limited technological advancement and dependability issues	1x5 Any five if written, Give full marks

13	Explain the health of an ecosystems from complex system's perspective with a help of graph.  Another way to understand the health of an ecosystem is by looking at it as a complex system. A complex system is defined as a system that is composed of many components which interact with each other in often unexpectable ways and in a non-linear fashion to show emergent behavior (unexpected behavior) and spontaneous order (they show some unexpected pattern in otherwise what looks like chaos). These factors make such systems very difficult to model or simulate on a computer. Ecosystems are a classic example of a complex system where each component in the system is the biodiversity it hosts. When a complex system has few components, it is known as a "efficient system" as it can transmit anything through it with very little loss. But it is also very susceptible to collapse if a few components fail and hence have very low sustainability (meaning Complex systems which are efficient, usually fail more often). On the flipside, if the system has too many components, it becomes a "stagnant system" as there is a lot of loss from whatever it is that you are trying to transmit through the system and hence again have very low sustainability. But they are very resilient to changes as they can withstand failure of many components in them. As research has shown in the graph above, most stable ecosystems occupy a space called the "window of vitality" where they have just the right amount of biodiversity that allows them good sustainability and also resiliency. Any changes to the biodiversity to the ecosystem can push it away from this window of vitality and accelerate their demise. This is another reason why biodiversity of ecosystems need to be protected.	2 1 1 1
14	Write down five environmental consequences of Ballari mining scam • The real tragedy of the Ballari wanton mining is the extent of damage to the people and environment of Ballari. The unsuppressed red dust released from mines are now the major source of respiratory illness in the region, especially for the children who were illegally employed in the mines and the women.	1x5

	• When it rains in the region, the water collect the mud from the mines and deposit it in the Tungabhadra river and clog the Tungabhadra reservoir. As a result, the total capacity of the reservoir has fallen from about 133 thousand million cubic meters (TMC) to 99 TMC in recent years. • Furthermore, because the refuse from the mines were not stored properly, they also enter the forest regions during the monsoons and destroy them causing many species like the Egyptian Vulture and Four-horned antelopes population to completely vanish. • Besides this, the mining has also impacted the earlier main source of employment in the region, **Agriculture**. The top soil in most farms are now covered with iron rich soil making it nearly impossible to farm on them. This has made people very dependent on the mines for their employment. • Now that the mines are closed, the total economy and, as a result, the resiliency of the locals has been destroyed and has led to extreme poverty in the region.	