

Unit-II

ENERGY

A. Powering Nations

Comprehension questions :

1. What are the primary reasons for the energy crisis in our country?

The primary reasons for the present power crisis in India are as follows:

1. Demand is more than supply and this is the main cause of present power crisis. During the five year plans stress was given on the development of industries. But to cope with the industrial development, equal stress was not given on the development of power.
2. Most of the power stations of India are of thermal origin. Frequent breakdown of machineries hampering the production of power.
3. Raw materials for thermal power sometimes do not reach the stations in proper time.
4. Low grade raw materials hampering production.

2. How do you think the ‘scramble for energy’ is likely to hurt the image of India bring a ‘bridge nation’?

Fraternalizing with these countries can undermine India’s broader geopolitical ties and its record as a democratic nation, and potentially hurt our efforts to become a ‘bridge nation’ between countries in the West and the East.

3. Why do you think reform in energy sector is held back unlike the reforms in telecom sector?

Our domestic energy industry is dominated by inefficient, entrenched government-owned monopolies. The state of India’s energy sectors such as power and coal is similar to our telecom sector in the mid 1980s- plodding, entrenched and highly resistant to reform.

4. Why does the writer state, ‘Energy subsidies are a big obstacle to efficiency gains as well as to changing energy behavior and popularizing clean energy solutions? Do you agree with this?

Yes, because they have only worsened what they were meant to solve-widespread energy shortages. In fact the more the shortage, the less successful the subsidy usually is, thanks to the massive 'leakages' that occur across our supply chain.

5. For India to become 'developed economy' energy supply and sustainability are critical. Do you agree? Give reasons for your answer?

Yes. India must genuflect to the subsidy economy, and the tradition of freebies surrounding energy is a gold-standard as a vote-getting campaign promise. While the central government keeps oil and kerosene prices low and the energy sector goes under price controls, state governments across India incorporate free power to farmers into their election promises.

6. The writer points out that, 'our ability to achieve social goals and to effectively create jobs and provide food, health services, housing, education, transportation, communication services and security depends on the availability of energy, 'thereby suggesting that energy is fundamental to a nation's growth. Do you agree or disagree with this viewpoint? Give reasons.

Yes, In the midst of all our challenges in fuel supply and new environmental standards, we cannot overlook one fact: in a year an Indian on average consumes about one-fifteenth the energy the typical American consumes. Thanks to our surging growth, we have nowhere to go but up in our consumption of energy.

Grammar Part - Idioms

1. Read the following sentences and identify the idioms

a. Run into the ground- if something such as an activity or a plan runs into the ground, it fails the

talks ran into the ground because the ceasefire was broken.

b. owing to-because of something; due to the fact of something. Owing to the lateness of the

evening, I must go home. We were late owing to the heavy traffic.

2. What do the following idioms mean? Use them in your own sentences.

1. Account for

a. To keep a record of how money has been spent: The job of the treasurer is to account for every Penny that is earned or spent.

b. To know or find out where something or someone is: She has accounted for every item that was missing.

2. Hang out

a. To suspend something outdoors or in an exposed way: The maid hung the clothes out to dry. We hung the socks out on the clothesline. My shirttails were hanging out when I got there.

b. To spend time with someone or at some place: My friends and I hung out at the mall.

3. To cut a long story short

Something that you say when you are about to stop telling someone all the details of something that happened and tell them only the main facts

4. Take advantage of

a. To put to good use; avail oneself of: take advantage of all educational opportunities.

b. To make use of for selfish reasons; achieve a selfish goal by exploiting: took advantage of him by leaving him with the bill; took advantage of his unsuspecting nature.

5. Go the extra mile

a. To make more effort than is expected of you (often + *for*) He's a nice guy, always ready to go the extra mile for his friends.

b. To try harder to please someone or to get the task done correctly; to do more than one is required to do to reach a goal. I like doing business with that company. They always go the extra mile. My teacher goes the extra mile to help us.

6. Better off

a. In a better or more prosperous condition: would be better off taking the train instead of driving; felt better off after the rise in stock prices.

b. In a more favorable position or financial circumstances. For example, they were better off flying than driving there, or they were better off than most of their neighbors.

7. In favor of

a. In support of; approving: We are in favor of her promotion to president.

b. Inscribed or made out to the benefit of: a check in favor of a charity.

8. Make a difference

a. Distinguish or discriminate. This phrase appears in the Bible (Leviticus 11:47):

"To make a difference between the unclean and the clean."

b. To have an effect It is exciting to do something that really makes a difference in your community. People don't realize that their vote can make a difference.

9. Apple of my eye

a. The most favorite or cherished person.

In Psalm 17:8, the Psalmist asks God to "keep me as the apple of your eye."

10. Tongue in cheek

In a way that is not serious, although it appears to be Karl explained, tongue in cheek, that he was busy with housecleaning.

B. WIND ENERGY

Comprehension questions:

1. Describe how wind energy is produced?

The wind's kinetic energy can be harnessed by a wind turbine, a device that looks like an extremely tall, skinny fan. When wind moves the blades of the fan, they spin a central hub. The spinning hub moves a series of gears connected to a generator, which converts the mechanical energy into electrical energy for distribution.

2. Why did wind energy utilization decline even though it was in use for thousands of years?

Wind energy utilization declined even though thousands of years ago because it was used to propel ships and to produce mechanical energy for pulling up water from wells and grinding agriculture produce.

3. What are the reasons for its revival in the last three decades?

The reasons for wind energy revival in the last three decades are:

1. Wind electric generators connected to this grid can reduce consumption of diesel.

2. Wind energy being clean and ecofriendly.

3. Wind potential is even more of a localized concept than the solar energy.

4. Mention the three different modes through which wind generated electricity is put to use.

Wind generated electricity has been used in three different modes. Small wind electric generators below 4kw capacity and wind electric middle range of 20 to 100kw and third one is the wind electric generators in the range of 50 to 300 kw capacities has been used in grid connected wind farms.

5. List the advantages and disadvantages of wind energy. Do the advantages outweigh the disadvantages?

The advantage of wind energy is mainly to produce the electricity and then essential air in motion carries its kinetic energy. This kinetic energy is converted into mechanical or electrical energy. Systems utilizing wind energy for generation of power produce no air pollutants or green house effect. The disadvantages are very little, power fluctuations due to uncertainty of wind, variations in magnitude and directions of wind velocities, structural instability due to heavy gusts and cyclonic storms.

6. In the light of current research and development, do you foresee a time when wind energy would emerge as the most significant form of energy?

Yes, wind energy is one of the most important renewable energy resources for the future, because it can be harnessed in a clean and inexhaustible manner through the application of technically advanced and efficient systems.

7. How can generation and distribution of wind energy become more localized, to cater to the needs of the people living in a particular area?

Small wind turbines can be used in residential settings to directly offset electricity usage using net metering, where power that is not used by the home is credited to the customer as it flows back on to the electricity system. Wind turbines used near homes are commonly in the 1- to 10-KW range but can be larger. They can be used to partially offset load or support a completely off-grid home. These turbines can sometimes be integrated with other components, such as PV systems and storage and power converters.

When there is not enough wind to start up a wind turbine, the house gets all of its electricity from the distribution system. When wind speeds are moderate, the wind turbine offsets some or all of the home's electricity. When it is very windy, the wind turbine produces more electricity than the home uses, so excess electricity is metered, and credited to the customer, as it flows back on to the distribution grid.

DESCRIPTIVE: 10 Marks Questions

Write an essay on 'Wind Energy'

Exploring wind energy through various means is a very old concept. Thousands of years ago, wind energy was used to propel ships and to produce mechanical energy for pulling up water from wells and grinding agricultural produce. This is the evidence that the ancient Egyptians used wind mills as early as 3600 BC to pump water for irrigating agricultural lands and to grind grains. The Kinetic energy is converted into either mechanical or electrical energy. The mechanical uses of wind for driving ships, pumping water, grinding grains, turning the machines of the factories and doing a large variety of other tasks advanced steadily over the centuries.

The old wind turbines were no longer economically competitive with conventional sources of energy. Therefore, very little research was done to develop new and more efficient wind turbines. The development of wind turbines to generate electricity was resumed in the mid-1970s in response to the energy crisis during 1973. As a result, wind turbine technology improved considerably and the cost of electricity produced by wind turbines decreased dramatically.

If electricity is produced, the combination of turbine and generator may be called a wind generator or an aero generator. Because of the confusion of these terms, the acronym WECS is increasingly used.

Wind generated electricity has been used in three different modes. Small wind electric generators below 4kw capacity have been used as battery chargers and a large number of such units are commercially available in many countries. Wind electric generators in the range of 50 to 300kw capacities have been used in grid connected wind farms. At present this mode of application is very prominent and a large number of wind farms in many countries such as USA, Sweden, Denmark, India, etc. are working. Wind electric generators in the middle range of 20 to 100 kw have been used in standalone models supplemented by power from diesel generator sets. Many such locations in India are Lakshadweep, Bet-Dwarka, Leh, etc, where a small local grid is operated by diesel generator and wind electric generators connected to this grid can reduce consumption of diesel.

Although many types of wind electric generators (aero generators) have been introduced from time to time, there are basically two designs which have been put to real application. One is the conventional horizontal axis propeller type wind turbines with two or three aerofoil blades. These are the most popular and extensively used machines. The other is the Darrieus type vertical axis wind turbine which is of relatively recent origin. These machines are still at a developmental stage and are not so popular.

In addition to wind energy being clean and ecofriendly, the limitation of harnessing energy from the wind is that it is intermittent like solar energy and also diffuse i.e., only a relatively small amount of energy can be obtained from a given local area. Wind potential is even more of a localized concept than the solar energy. Power fluctuations due to uncertainty of wind, variations in magnitude and directions of wind velocities, structural instability due to heavy gusts and cyclonic storms are also some of the problems associated with wind energy conversion systems. Research and development is continuing for development of more pitch regulated, jaw controlled and structurally robust wind energy generators. However, wind energy is still one of the most important renewable energy resources for the future, because it can be harnessed in a clean and inexhaustible manner through the application of technically advanced and efficient systems.

Grammar – MODAL VERBS - pg-115

A. Identify the modal verbs and their function in the following sentences :

1. One of nature's renewable resources of energy, wind, can be harnessed to provide an environmentally friendly and reliable source of energy. can=ability
2. A device for direct mechanical work through wind power is often called a windmill or a wind turbine and if electricity is produced, the combination of turbine and generator may be called a wind generator or an aero generator. May=possibility

B. Note how modals are used in the following sentences to express habit, advice, ability, permission, obligation, possibility. Say which sentence illustrates which use.

1. He can read about hundred pages in an hour's time of the material is familiar.= ability
2. Students should not make noise in the auditorium as it distracts the performers.=advice

3. You will have to make the payment by tomorrow.= obligation
4. May I leave the class early today as I have to catch my train? = permission
5. The University might declare Friday a holiday because of the local festival.= possibility
6. When we lived in Delhi we would often eat in that restaurant.= habit

C. Identify the modal verbs and their uses in the following paragraph.

For human development to continue, we need to find conventional sources of renewable energy. Wind energy conversion has to be seriously explored because in the past it has been highly useful and its future is promising. The wind turbines can (ability) provide free, reliable and non-polluting power for our daily needs. Researchers have made available a patented polypropylene blade design which would (habit) allow the wind turbine to function at full power in great speeds, of up to 150 miles per hour. On the whole, wind turbines may(possibility) satisfy part of our power needs in the near future.

Part –II

A. NUCLEAR POWER

1. Identify the conflict between the government's aim and people's fears?
 - A. Installation of the nuclear power plants (fundamental) is the conflict between the government's aim and people's fear.
2. What were the beliefs of the protagonists of nuclear power in the initial stages?
 - A. The beliefs of the protagonists of nuclear power in the initial stages are:
The nuclear power was so cheap and clean that even meters were not really needed. Electricity from nuclear reactors was to be given away free to the world.
3. How were those beliefs belied?
 - A. By considering the environmental concerns like global warming and by seeing the losses to the mankind like Chernobyl incident etc. are the beliefs belied.
4. What is India's nuclear power capability now?
 - A. The capacity of India's twenty nuclear power plants is only 3% of the country's electricity.
5. Why aren't tourists allowed to visit the Chernobyl plant even 25 years after the disaster?

A. Tourists are flocking to Chernobyl, the site of the worst nuclear disaster in history, almost 25 years after the explosion at the Soviet-era nuclear reactor. Tourists pay £100 a day to visit the site, where radiation levels are thought to be around 35 times higher than normal. After signing a form agreeing to anti-contamination rules such as not eating and smoking within the site, visitors are ferried by buses to the entrance of the zone, which is only open to those on tours or with special permission.

6. List out the prevalent fears regarding the nuclear power plants. Do you think they are genuine or are we being led to believe them?

A. The prevalent fears regarding the nuclear power plants are climate changes, lack of safety measures, huge maintenance and installation cost, less output compared to other sources and more dangerous. Yes, they aren't genuine even though we are led to believe them in initial stages.

7. What suggestion do experts offer to meet the demand of the state? Do you agree with the suggestion?

A. To expand capacity of nuclear power plants is the experts suggestion to meet the demand of the state. Yes, I agree with the suggestion.

8. What are your suggestions for "Bridging the widening gap" between the demand and supply for power?

A. Usage of renewable energy sources and alternative energy sources are my suggestions for "Bridging the widening gap" between the demand and supply for power.

DESCRIPTIVE: 10 Marks Questions

1. Describe reasons for the protest against Koodankulam Nuclear Power Project.

A. The people of Koodankulam village themselves were misled by false promises such as 10,000 jobs, water from Pechiparai dam in Kanyakumari district, and fantastic development of the region. Now the people of Koodankulam know and understand that this is not just a fisher folk's problem, they may be displaced, and they have to deal with radioactive poison. And (almost) all

of us here in the southernmost tip of India oppose the Koodankulam Nuclear Power Project (NPP) for a few specific reasons:

1. The Koodankulam Nuclear Power Project (KKNPP) reactors are being set up without sharing the Environmental Impact Assessment (EIA).
2. The Tamil Nadu Government G.O. 828 (29.4.1991 – Public Works Department) establishes clearly that “area between 2 to 5 km radius around the plant site, [would be] called the sterilization zone.” This means that people in this area could be displaced. But the KKNPP authorities promise orally and on a purely adhoc basis that nobody from the neighboring villages would be displaced.
3. More than 1 million people live within the 30 km radius of the KKNPP which far exceeds the AERB (Atomic Energy Regulatory Board) stipulations. It is quite impossible to evacuate this many people quickly and efficiently in case of a nuclear disaster at Koodankulam.
4. The coolant water and low-grade waste from the KKNPP are going to be dumped in to the sea which will have a severe impact on fish production and catch.
5. Even when the KKNPP projects function normally without any incidents and accidents, they would be emitting Iodine, Cesium, isotopes, strontium, tritium, tellurium and other such radioactive particles into our air, land, crops, cattle, sea, seafood and ground water.
6. Already the southern coastal belt is sinking with very high incidence of cancer, mental retardation, Down syndrome, defective births due to private and government sea-sand mining for rare minerals including thorium.
7. Indian Prime Minister himself has spoken about terrorist threats to India’s nuclear power plants.
8. The March 11, 2011 disaster in Fukushima has made it all too clear to the whole world that nuclear power plants are prone to natural disasters and no one can really predict their occurrence.
9. Even the most industrialized and highly advanced country such as Germany has decided to phase out their nuclear power plants by the year 2022. Switzerland has decided to shun nuclear power technology. In a recent referendum, some 90 percent of Italians have voted against nuclear power in their country. Many Japanese prefectures and their governors are closing nuclear power plants in their regions. Both the United States and Russia have

not built a new reactor in their countries for 2-3 decades ever since major accidents occurred at Three Mile Island and Chernobyl.

10. And finally, the Indian government's mindless insistence on nuclear power, utmost secrecy in all of its nuclear agreements and activities, and its sheer unwillingness to listen to the people's concerns and fears make us very doubtful about the real benefactors of all this nuclear plant.

When we cannot effectively deal with a nuclear disaster, it is only prudent to prevent it from occurring.

B Nuclear Power: Advantages and Disadvantages

1 Discuss about nuclear power plant. Write any five advantages and disadvantages.

Definition: A nuclear power plant is a facility that converts atomic energy into usable power. In a nuclear electric power plant, heat produced by a reactor is generally used to drive a turbine which in turn drives an electric generator

Advantages of nuclear power

1. The generation of electricity through nuclear energy reduces the amount of energy generated from fossil fuels (coal and oil). Less use of fossil fuels means lowering greenhouse gas emissions (CO^2 and others).
2. Currently, fossil fuels are consumed faster than they are produced, so in the next future these resources may be reduced or the price may increase becoming inaccessible for most of the population.
3. Another advantage is the required amount of fuel: less fuel offers more energy. It represents a significant save on raw materials but also in transport, handling and extraction of nuclear fuel. The cost of nuclear fuel (overall uranium) is 20% of the cost of energy generated.
4. The production of electric energy is continuous. A nuclear power plant is generating electricity for almost 90% of annual time. It reduces the price volatility of other fuels such as petrol.

5. This continuity benefits the electrical planning. Nuclear power does not depend on natural aspects. It's a solution for the main disadvantage of renewable energy, like solar energy or wind energy, because the hours of sun or wind does not always coincide with the hours with more energy demand.
6. It's an alternative to fossil fuels, so the consumption of fuels such as coal or oil is reduced. This reduction of coal and oil consumption benefits the situation of global warming and global climate change. By reducing the consumption of fossil fuels we also improve the quality of the air affecting the disease and quality of life.

Disadvantages of nuclear power

1. Despite the high level of sophistication of the safety systems of nuclear power plants the human aspect has always an impact. Facing an unexpected event or managing a nuclear accident we don't have any guarantee that decisions we took are always the best. Two good examples are Chernobyl and Fukushima.
2. The Chernobyl nuclear accident is, by far, the worst nuclear accident in the history. Different wrong decisions during the management of the nuclear plant caused a big nuclear explosion.
3. One of the main disadvantages is the difficulty in the management of nuclear waste. It takes many years to eliminate its radioactivity and risks.
4. The constructed nuclear reactors have an expiration date. Then, they've to be dismantled.
5. Nuclear plants have a limited life. The investment for the construction of a nuclear plant is very high and must be recovered as soon as possible, so it raises the cost of electricity generated. In other words, the energy generated is cheap compared to the cost of fuel, but the recovery of its construction is much more expensive.
6. Nuclear power plants are objectives of terrorist organizations.
7. Nuclear power plants generate external dependence. Not many countries have uranium mines and not all the countries have nuclear technology, so they have to hire both things overseas.
8. Current nuclear reactors work by fission nuclear reactions. These chain reactions are generated in case control systems fail, generating continuous reactions causing a radioactive explosion that would be virtually impossible to contain.

Probably the most alarming disadvantage is the use of the nuclear power in the military industry. The first use of nuclear power was the creation of two nuclear bombs dropped on Japan during World War II