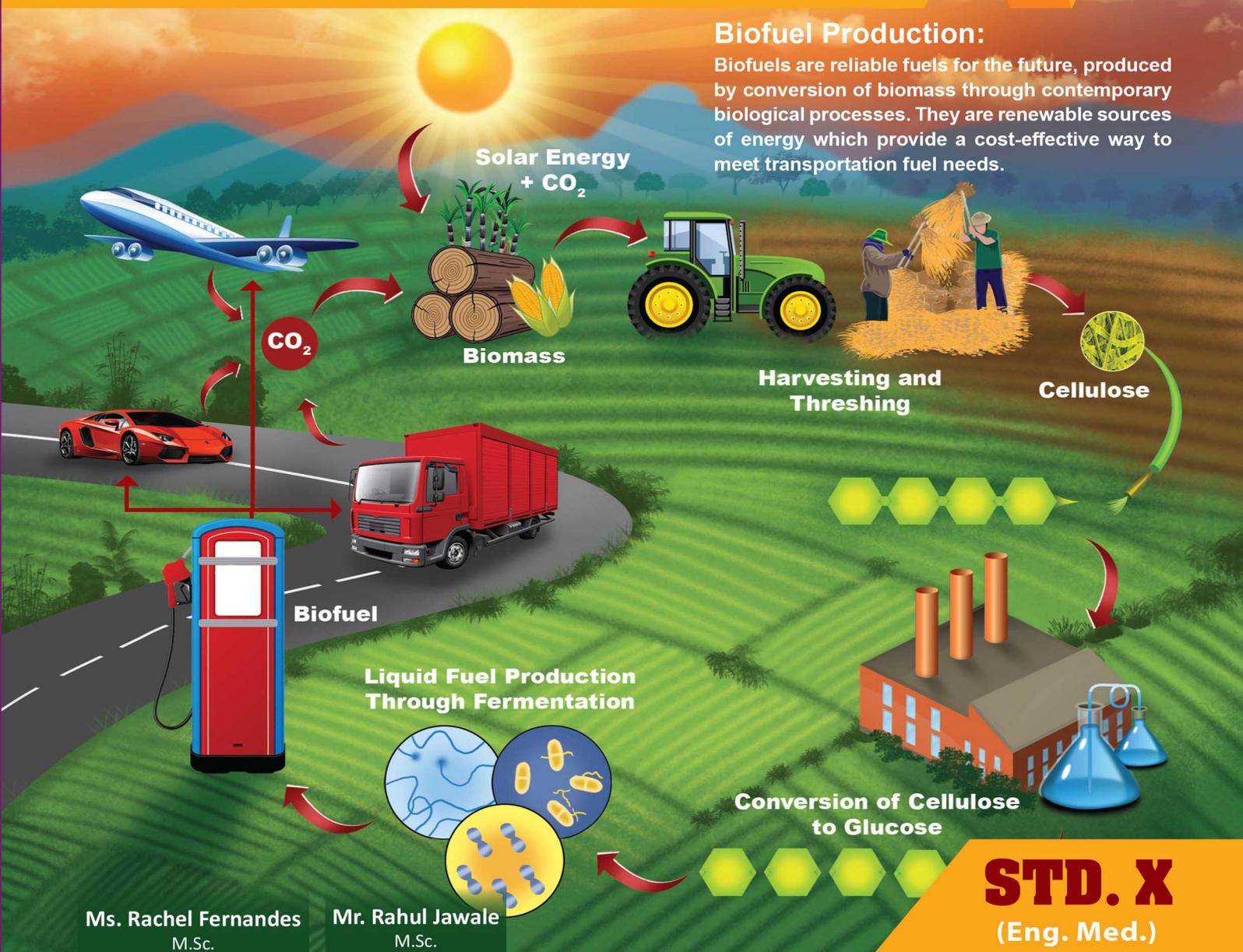




SCIENCE AND TECHNOLOGY (PART - 2)

BASED ON TEXTBOOK AND BOARD PAPER PATTERN



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STD. X
(Eng. Med.)



Based on the **Latest Board Paper Pattern** prescribed by the Maharashtra State Board of Secondary and Higher Secondary Education, Pune - 04

PERFECT

Science and Technology (Part – 2)

STD. X

Salient Features

- Written as per Latest Board Paper Pattern.
- Exhaustive coverage of entire syllabus.
- Memory maps provided for revision at a glance.
- ‘Reading between the lines’ provided for concept elaboration.
- Chapter-wise assessment with every chapter for knowledge testing.
- Model Question Paper in accordance with the Latest Board Paper Pattern.
- Includes Solved Board Questions of March and December 2020.
- Activity / project explanation videos included wherever required.
- Includes Board Question Paper of March 2022 (Solution in PDF format through QR code)

This book comprises of **QR Codes** at strategic touch points. You can simply scan this Code through your Smartphone camera and get a plethora of subject knowledge at your disposal. The QR Codes included herein would take you to videos that shall provide you a better understanding of ‘Activities’, ‘Experiments’, ‘Projects’ and ‘Try This’ section of the book. We hope students would maximize the use of this book with the aid of these videos.

Scan the adjacent QR Code to download Quill-The Padhai App.

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PREFACE

While designing the book, our main intention was to create a book that would act as a single point of reference for students. We wanted this book to provide students, the much needed answers for their textual questions as well as build up their knowledge quotient in the process.

‘Perfect Notes Science & Technology Part – 2, Std. X’ has been prepared as per the Latest Board Paper Pattern.

We have infused the book with a liberal sprinkling of suitable examples and additional questions wherever required. A series of ‘Intext Questions’ along with questions titled under ‘Use your brain power’, ‘Can you tell’ and various similar titles pave the way for a robust concept building.

Every chapter begins with covering all the textual content in the format of Objectives, Question - Answers, Give Reasons, Diagram-based questions, Paragraph based questions and a host of other Objective and Subjective type of questions, to aid the students in their exam preparation. For the students to grasp a better understanding of the concept lying behind the answer, ‘Reading between the lines’ (not a part of the answer) has been provided wherever necessary. To enhance audio-visual learning, videos explaining activities / projects are included wherever required.

To keep students updated, solved questions from Board papers of March 2019, July 2019, March 2020 and December 2020 are included.

Wherever possible, questions are allotted with marks in accordance with the new marking scheme. Questions can be modified as per the new marking scheme and asked in the examination. Memory maps have been included in each chapter to provide a quick revision of the important topics of that chapter. The chapter eventually ends with a Chapter wise Assessment that stands as a testimony to the fact that the child has understood the chapter thoroughly. Model question paper, designed as per the latest paper pattern, is a unique tool to enable self-assessment for the students.

We have provided **QR Code** for students to access the ‘Answer Key’ given for the Model Activity sheet’.

With absolute trust in our work, we hope our holistic efforts towards making this book an ideal knowledge hub for students pays off.

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we’ve nearly missed something or want to applaud us for our triumphs, we’d love to hear from you.

Please write to us at: mail@targetpublications.org

A book affects eternity; one can never tell where its influence stops.

Best of luck to all the aspirants!

From,
Publisher
Edition: Fourth

GG - Gyan Guru



We present to you our very own mascot-'GG'. GG is a student-buddy who pops up throughout the book and draws your attention to important bits of knowledge also termed as 'Gyan Guru'. This 'Gyan Guru' section helps you understand a concept distinctly with a corresponding example, which you can relate to easily. This is our initiative that helps to link learning with life, thereby educating the students much more practically. We're hopeful that you will love this initiative.

Disclaimer

This reference book is transformative work based on 'Science and Technology Part - 2; Reprint: 2020 published by the Maharashtra State Bureau of Textbook Production and Curriculum Research, Pune. We the publishers are making this reference book which constitutes as fair use of textual contents which are transformed by adding and elaborating, with a view to simplify the same to enable the students to understand, memorize and reproduce the same in examinations.

This work is purely inspired upon the course work as prescribed by the Maharashtra State Bureau of Textbook Production and Curriculum Research, Pune. Every care has been taken in the publication of this reference book by the Authors while creating the contents. The Authors and the Publishers shall not be responsible for any loss or damages caused to any person on account of errors or omissions which might have crept in or disagreement of any third party on the point of view expressed in the reference book.

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KEY FEATURES

GYAN GURU

Gyan Guru section helps to understand a concept distinctly with corresponding example, which you can relate to easily.

APPLY YOUR KNOWLEDGE

The section 'Apply your Knowledge' covers different types of questions like "can you recall", "Internet my friend", etc. for better concept-building.

READING BETWEEN THE LINES

Reading between the lines for the better understanding of the concept.

SOLVED BOARD QUESTIONS

Solved Board Questions of March 2019-20, July 2019 and December 2020 to familiarize students with the types of questions asked in board examinations.

MEMORY MAPS

Memory Maps to provide quick revision of the important topics of the chapter.

CHAPTER ASSESSMENT

Chapter Assessment helps students analyze their preparedness of the chapter.

MARKING SCHEME

Wherever possible, questions are allotted with marks in accordance with new marking scheme.

Q.R. CODE

QR code provides:

- i. Access to a video/PDF in order to boost understanding of a concept or activity
- ii. 'Answer key' for Model Question Paper & Board Question Paper of March 2022

QUESTION PAPERS

Model Question Paper and Board Question Paper are provided for the students to know about the types of questions that are asked in the Board Examinations.

NEW QUESTIONS TYPES

Coverage of new type of questions – diagram based question, paragraph based question, etc.

PAPER PATTERN

- There will be separate question papers for Part 1 and Part 2 of 40 marks each.
- Duration of each paper will be 2 hours.

Question No.	Type of Questions	Total Marks
1.	(A) 5 Questions of 1 mark each (MCQs)	05
	(B) 5 Questions of 1 mark each (Objectives)	05
2.	(A) 3 Questions of 2 marks each (Solve any 2)	04
	(B) 5 Questions of 2 marks each (Solve any 3)	06
3.	8 Questions of 3 marks each (Solve any 5)	15
4.	2 Questions of 5 marks each (solve any 1)	05

Distribution of marks according to question type and aims

Sr. No.	Question type	Marks	Marks with option	% Marks	Sr. No.	Aims	Marks	Marks with option	% Marks
1.	Objective	10	10	25	1.	Knowledge	10	10	25
2.	Very short answer	10	16	25	2.	Understanding	10	15	25
3.	Short answer	15	24	37.5	3.	Application	16	24	40
4.	Long answer	5	10	12.5	4.	Skill	4	6	10
	Total	40	60	100		Total	40	60	100

[Maharashtra State Board of Secondary and Higher Secondary Education, Pune - 04]

CONTENTS

No.	Topic Name	Marks	Marks with option	Page No.
1.	Heredity and Evolution	03	05	1
2.	Life Processes in Living Organisms Part - 1	04	06	19
3.	Life Processes in Living Organisms Part - 2	05	07	39
4.	Environmental Management	05	07	61
5.	Towards Green Energy	04	06	81
6.	Animal Classification	04	06	99
7.	Introduction to Microbiology	04	06	126
8.	Cell Biology and Biotechnology	04	06	144
9.	Social Health	04	06	162
10.	Disaster Management	03	05	177
	Model Question Paper Part - 2	-	-	200
	Board Question Paper of March 2022 (Solution in PDF format through QR code)	-	-	203
	<ul style="list-style-type: none"> • <i>For your own understanding, scan the adjacent QR code to download the Reduced / Non-Evaluative Portion for academic year 2021-22.</i> 			

**Note: Textual exercise questions are represented by * mark.
Modified textual questions are represented by ♣ mark.**

Exam Pointers

Students are expected to write the answers in their Examination as illustrated below.

Multiple Choice Questions: Write only the correct option while answering the MCQ.

1. Which of the following nitrogenous base is NOT present in DNA?
(A) Thymine (B) Uracil
(C) Adenine (D) Guanine
Ans: (B)

Find out the correlation – Determine the correlation between two components and re-write it.

2. *Herdmania* : Urochordata :: *Amphioxus* : _____
Ans: *Herdmania* : Urochordata :: *Amphioxus* : Cephalochordata

Reading between the lines

The explanation provided under ‘Reading between the lines’ is not expected to be a part of the answer. Its sole purpose is to provide a sound understanding of the concept behind the answer.

1. What will happen if number of consumers in environment goes on increasing gradually?

- Ans: i. If the number of consumers in the environment goes on increasing gradually, there would be a decline in the number of the prey they feed on.
ii. A decline in the number of prey, would eventually result in a decline in the number of consumers due to scarcity of food.

Hence, increase in the number of consumers in the environment would cause an imbalance in the ecosystem.

Answer



Reading between the lines

Considering there is a gradual increase in the number of herbivores;

- *The number of producers will be comparatively less to fulfill the food requirements of large number of primary consumers (herbivores).*
- *As a result, many of the primary consumers (herbivores) will die due to the lack of availability of food.*
- *Eventually, secondary consumers (carnivores) depending upon these primary consumers will also die due to lack of food, thereby disrupting the entire food chain.*

Not a part of the answer

Practicing model papers is the best way to self-assess your preparation for the exam Scan the adjacent QR Code to know more about our **“SSC 53 Question Papers & Activity Sheets With Solutions.”**



Going through the entire book in the last minute seems to be a daunting task? Go for our **“Important Question Bank (IQB)”** books for quickly revising important questions Scan the adjacent QR Code to know more.



Once you solve 1000+ MCQs in a subject, you are going to become a pro in it. Go for our **“Science and Technology MCQs (Part - 1 & 2)”** & become a pro in the subject. Scan the adjacent QR code to know more.



Sample Content

5

Towards Green Energy

Choose the correct alternative [1 Mark each]

- In a power plant based on natural gas, the natural gas burns in the presence of air in the _____.
(A) condenser
(B) combustion chamber
(C) turbine
(D) transformer
- Incomplete combustion of fuels leads to formation of _____. [Mar 2020]
(A) Carbon monoxide
(B) Carbon dioxide
(C) Chlorofluorocarbon
(D) Hydrogen sulphide
- Water reservoir possesses _____ energy. [Dec 2020]
(A) Nuclear (B) Thermal
(C) Kinetic (D) Potential
- In a hydroelectric power plant,
(A) potential energy possessed by stored water is converted into electricity.
(B) kinetic energy possessed by water is converted into potential energy.
(C) fuel is burned in presence of water to produce electricity.
(D) water is converted into steam to produce electricity.
- In hydroelectric power plant, the _____ energy of the flowing water drives the turbine.
(A) chemical (B) potential
(C) kinetic (D) Light
- In nuclear fission, neutron is bombarded on atom of
(A) Uranium 236 (B) Barium
(C) Krypton (D) Uranium 235
- Solar photovoltaic cells convert solar energy directly into _____ energy.
(A) nuclear (B) electrical
(C) potential (D) chemical
- Out of the following energy sources, which has the least consumption for electrical power generation in the world?
(A) Coal (B) Hydroelectric
(C) Solar (D) Nuclear
- A good solar cell can have an efficiency of around
(A) 15% (B) 100%
(C) 75% (D) 25%

Answers:

- (B) 2. (A) 3. (D) 4. (A)
5. (C) 6. (D) 7. (B) 8. (C)
9. (A)

Name the following [1 Mark each]

- Principle invented by Michael Faraday on which an electric generator works
- Problem caused by nitrogen dioxide generated due to burning of fuels like coal, diesel, petrol etc.
- Device used to transform the voltage and current levels of the generated power
- Device used to rotate the magnet in the generator
- Instrument through which the water in cooling tower is circulated in the thermal power plant
- Particles generated due to incomplete burning of fossil fuels which cause air pollution
- The machine which converts the kinetic energy of wind to electrical energy
- The basic unit in solar electric plant
- Special type of material solar cells are made up of

Answers:

- Electromagnetic induction 2. Acid rain
3. Transformer 4. Turbine
5. Condenser 6. Soot particles
7. Wind turbine 8. Solar cell
9. Semiconductors

True or False.

If false, write the correct sentence

[1 Mark each]

- To drive the turbine, we need a generator.
- In a thermal power plant, chemical energy in coal is converted to electrical energy.
- In a power plant based on natural gas, pressurised air is introduced into the combustion chamber using a generator.
- In the process of fission, Uranium- 236 converts into atoms of Barium and Krypton releasing two neutrons and 200 MeV energy.
- Since natural gas contains sulphur, burning of natural gas results in less pollution.
- The potential difference generated across a solar cell is independent of its area.
- When solar panels are connected in parallel, they form a solar string.



8. Power generation based on coal has higher efficiency than power generation based on natural gas.

Answers:

- False.
To drive the turbine, we need an energy source.
- True.
- False.
In a power plant based on natural gas, pressurized air is introduced into the combustion chamber using a compressor.
- False.
In the process of fission, Uranium- 236 converts into atoms of Barium and Krypton releasing three neutrons and 200 MeV energy.
- False.
Since natural gas does not contain sulphur, burning of natural gas results in less pollution.
- True.
- False.
When solar panels are connected in series, they form a solar string.
- False.
Power generation based on coal has lower efficiency than power generation based on natural gas.

Odd one out

[1 Mark each]

- Gear box, bearing, gas turbine, blades.
- Wind, LPG, coal, crude oil.
- Solar array, inverter, transformer, absorber.

Answers:

- gas turbine
Gear box, bearing and blades are parts of a wind mill while gas turbine is part of power plant based on natural gas.
- Wind
LPG, coal, crude oil are not green energy sources while wind is a source of green energy.
- Absorber
Solar array, inverter and transformer are parts of solar photovoltaic station while absorber is part of solar thermal power station.

Complete the analogy

[1 Mark each]

- Combustion of fuel: boiler :: steam converted back to water : _____.
- Natural gas consumption in world: 22 % :: Natural gas consumption in India: _____.
- To transform the voltage and current levels : Transformer :: to convert DC solar power to AC solar power : _____.

Answers:

- condenser
Combustion of fuels takes place in the boiler while steam is converted back to water in the condenser.
- 8 %
Natural gas consumption in the world is 22 % and natural gas consumption in India is 8 %.
- Inverter
Transformer is used to transform the voltage and current levels of generated power. Similarly, inverter is used to convert DC solar power to AC solar power.

Match the following

- Remake the table taking into account relation between entries in three columns.

*i.

I	II	III
Coal	Potential energy	Wind electricity plant
Uranium	Kinetic energy	Hydroelectric plant
Water reservoir	Nuclear energy	Thermal plant
Wind	Thermal energy	Nuclear power plant

ii.

I Wind turbine Location	II Turbine capacity	III Blade length
Wind farm	2 kW	100 m
Home	6000-7000 kW	1.5 m
Off shore wind turbine	2000 kW	50 m

Ans:

i.

I	II	III
Coal	Thermal Energy	Thermal plant
Uranium	Nuclear energy	Nuclear power plant
Water reservoir	Potential energy	Hydroelectric plant
Wind	Kinetic energy	Wind electricity plant

ii.

I Wind turbine Location	II Turbine capacity	III Blade length
Wind farm	2000 kW	50 m
Home	2 kW	1.5 m
Off shore wind turbine	6000-7000 kW	100 m

**Answer the following**

1. **Intext Question. (Textbook page no. 47)**
How do we get different forms of energy?

Ans:

- Energy exists in different forms and can be converted from one form to another.
- Conventional energy resources or non-renewable energy resources (coal, diesel etc.) and non-conventional energy resources (solar energy, wind energy etc.) are used to get the different forms of energy.

2. **Can you tell? (Textbook page no. 47)**
How electric energy is produced?

OR

Explain how an energy source, a turbine and a generator are used to produce electric energy. [2 Marks]

Ans:

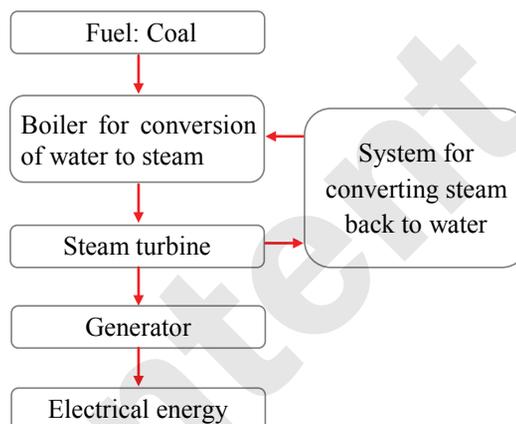
- Electricity is generated at a power station using an energy source, a turbine and a generator.
- The energy source is used to drive the turbine.
- A turbine has blades. A flow of liquid or gas is directed on these blades of the turbine, which causes them to rotate.
- The turbine which in turn is connected to an electric generator causes the magnet in the electric generator to rotate and electric energy is produced.

3. **With the help of a flow chart, explain the working of a thermal power station. [3 Marks]**

Ans:

- In thermal power plant, chemical energy in coal is converted to electrical energy.
- A thermal power plant consists of a boiler, a condenser, a turbine, a generator, pump and two towers (i.e., stack and cooling tower).
- Coal is combusted in the boiler. Using the thermal energy released during the burning of coal, steam of very high temperature and pressure is generated. The gases that are emitted during the combustion are released in the atmosphere through a very high tower known as stack.
- The steam is used to drive the turbine which in turn rotates the generator and electrical energy is produced.
- Once the turbine is rotated using the steam at high temperature and high pressure, the steam temperature and pressure decreases.

- The steam is then cooled in the condenser by using water from the cooling tower. Once the steam has condensed back to water, it is re-circulated to the boiler.
- The heat absorbed by the water from the cooling tower is released to the atmosphere in the form of vapour and heated air through the cooling tower.



Flow chart showing generation of electrical energy using thermal energy

- *4. **Which fuel is used in thermal power plant? What are the problems associated with this type of power generation? [3 Marks]**

Ans: Coal is used as fuel in thermal power plant.

Problems associated with thermal power generation:

- In thermal power plant, coal is burned which causes air pollution.
- Gases like carbon dioxide, sulphur oxide and nitrogen oxide which are harmful to health are emitted during the burning of coal.
- Soot particles are also released into the environment, which cause serious health problems related to the respiratory system.
- Coal which is used as a fuel in thermal power plant is available in limited quantity and will get depleted in the future.

5. **Intext Question. (Textbook page no. 49)**

If you see a thermal power station, you will observe two types of towers there. What are they?

Ans:

- In a thermal power station, the two types of tower are: stack and cooling tower.
- The stack is a very high tower through which gases that are emitted during the combustion of coal are released in the atmosphere.
- The cooling tower is used to store water and to release vapour and hot air from the steam in the atmosphere.



6. Can you tell? (Textbook page no. 50)
How does nuclear fission take place?

Ans:

- i. In nuclear fission, the atom of a heavy element is bombarded by a neutron to form an unstable isotope.
- ii. The unstable isotope further splits into two or more smaller nuclei releasing extra neutrons and energy.
- iii. In nuclear fission, huge amount of energy and heat is released.

7. Compare. (Textbook page no. 51)
Observe the schematic of thermal power plant and the nuclear plant. Discuss what are the similarities and differences between the two?

Ans: Similarities between thermal power plant and nuclear power plant:

- i. Both have a boiler for heating of water.
- ii. Both consist of a turbine which is used to rotate the generator.
- iii. Both consist of a generator which generates the electrical energy.
- iv. Both have a cooling tower where the steam is converted back to water
- v. Both consist of a condenser and pump which help in circulating the water.

Differences between thermal power plant and nuclear power plant:

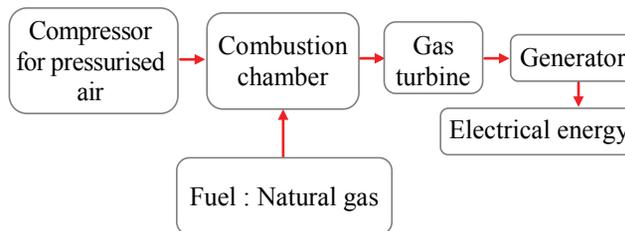
- i. Thermal power plant consists of two towers: a stack and a cooling tower while nuclear power plant consists of only the cooling tower.
- ii. The nuclear power plant consists of a nuclear reactor while the thermal power plant does not.

[Note: Students are expected to use the above information as reference to make their own observations and discuss.]

8. With the help of a flow chart, explain the working of a power plant based on energy of natural gas. [3 Marks]

Ans:

- i. In a power plant based on energy of natural gas, chemical energy in natural gas is converted to electrical energy.
- ii. It consists of a compressor, combustion chamber, gas turbine and a generator.
- iii. Pressurised air is introduced in the combustion chamber using a compressor.
- iv. In the combustion chamber, combustion of natural gas takes place in the presence of the air.
- v. A gas at very high temperature and pressure is generated in the chamber.
- vi. This gas is used to run the turbine which in turn rotates the generator to produce electrical energy.



Flow chart of power plant based on energy of natural gas

*9. Write short note on:
Electrical energy generation and environment. [3 Marks]

Ans:

- i. Electrical energy generation and its effects on the environment depend on the process that is used to produce the electrical energy.
 - a. **Electricity generation using fossil fuels:** Burning of fossil fuels like coal, natural gas lead to emission of harmful gases like carbon monoxide, nitrogen dioxide causing air pollution. Gases such as carbon dioxide, nitrogen dioxide produced during the burning of fossil fuels lead to environmental hazards such as global warming and acid rain. Soot particles generated due to incomplete combustion of fossil fuels can cause respiratory problems like asthma. Thus, electricity generation using fossil fuels is not environmental friendly.
 - b. **Electricity generation using nuclear fuels:** Improper nuclear-waste storage and disposal result in environmental contamination. Accidental leakage of nuclear radiation can lead to lethal disaster. Thus, electricity generation using nuclear fuel is not environmental friendly.
 - c. **Electricity generation using green energy sources:** Electricity generation using sources like water reservoir, wind, sunlight, bio-fuel etc. that are perpetual does not cause any pollution. Thus, electricity generation using these green energy sources is environmental friendly.
- ii. Considering the merits and demerits of all the above processes, the world is now heading towards environmental friendly energy i.e., green energy.

*10. What is meant by green energy? Which energy sources can be called as green energy sources and why? Give examples. [3 Marks]

Ans:

- i. Energy generated from sources which are unlimited and environmental friendly is called green energy.
- ii. Energy sources which are unlimited and environment friendly are called as green energy sources.



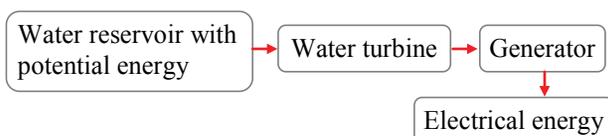
- iii. Green energy sources are called so because they are naturally replenished and do not cause any harm to the environment.
- iv. Example: wind, water reservoir, sunlight, bio-fuel are called as green energy sources.

11. With the help of a flow chart, explain the working of a hydroelectric power plant.

[3 Marks]

Ans:

- i. In a hydroelectric power plant, potential energy in water is converted to electrical energy.
- ii. High rise dams are constructed on rivers to obstruct the flow of water.
- iii. The stored water possesses potential energy.
- iv. This water stored at high level in a dam is then carried to the turbine, at the bottom of the dam. In this way, the potential energy in water is converted to kinetic energy.
- v. The kinetic energy of the fast flowing water drives the turbine which in turn rotates the generator to produce electrical energy.



Flow chart of different stages in hydroelectric power plant

12. State the advantages and disadvantages associated with hydroelectric power plant.

[2 Marks]

Ans:

Advantages of hydroelectric power plant:

- i. No fuel is burnt in a hydroelectric power plant. Thus, no air pollution due to combustion of fuel occurs.
- ii. Electricity can be generated whenever required if the dam has sufficient water storage.
- iii. During rainy season, the water in the water reservoirs can be replenished and used for power generation.

Disadvantages of hydroelectric power plant:

- i. Villages, towns, forests may submerge due to back-water caused by storage of water in dams. This leads to forced migration of the living population in that area.
- ii. The obstruction of the flow of river water may have adverse effect on the living world in the river.

13. What are the advantages of hydroelectric power generation?

[Mar 2019, Dec 2020]/[2 Marks]

Ans: Refer Answer the following: Q.12 (any two advantages).

***14. Give your opinion about whether hydroelectric plants are environment friendly or not?** [2 Marks]

[Students are expected to write their personal opinion based on the advantages and disadvantages given in Answer the following Q.12]

15. Use your brain power! (Textbook page no. 54)

i. With reference to point B in figure 5.17 of your textbook, potential energy of how much water in the dam will be converted into kinetic energy?

Ans: With respect to point B, potential energy of half of the water in dam can be converted into electrical energy.

ii. What will be the effect on electricity generation, if the channel taking water to turbine starts at point A in figure 5.17 of your textbook?

Ans: As height increases, potential energy increases. Thus, at point A, potential energy of water will be maximum. If a canal/penstock carrying water from dam starts at point A, this maximum potential energy will be converted into kinetic energy, due to which turbines will rotate with more speed. Thus, more electrical energy will be generated.

iii. What will be the effect on electricity generation, if the channel taking water to turbine starts at point C in figure 5.17 of your textbook?

Ans: As height decreases, potential energy decreases. Thus, at point C, potential energy of water will be minimum. If a canal/penstock carrying water from dam starts at point C, this minimum potential energy will be converted into kinetic energy, due to which turbines will rotate with less speed. Thus, less electrical energy will be generated.

16. State the function of the gear box in a wind mill? [1 Mark]

Ans: In a wind mill, the function of the gear box is to increase the rotations per unit time.

17. Depending on which factor, wind turbines are installed? [1 Mark]

Ans: Wind turbines are installed based on the wind velocity available at the site of installation.

18. Using a flow chart, explain the various stages of energy generation using wind energy.

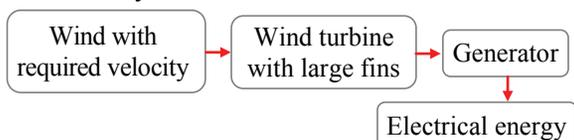
[3 Marks]

Ans:

- i. Electricity generation using wind energy is done with the help of a wind turbine.
- ii. A wind turbine is a machine used to convert the kinetic energy of the wind to electrical energy.



- iii. A wind turbine consists of rotating blades, a gear box and a generator.
- iv. When the wind strikes the blade of the turbine, the blades rotate.
- v. The axle of the turbine is connected to the electric generator through a gear-box.
- vi. The gear-box is used to increase the rotations per unit time.
- vii. In this way, the rotating blades run the turbine which in turn drives the generator to produce electricity.



Flow chart showing stages in electric generator using wind energy

19. What is photo-voltaic effect? [1 Mark]

Ans: The process of a solar photo-voltaic cell converting solar radiations energy directly into electrical energy is called photo-voltaic effect.

***20. How can we get the required amount of energy by connecting solar panels? [2 Marks]**

Ans:

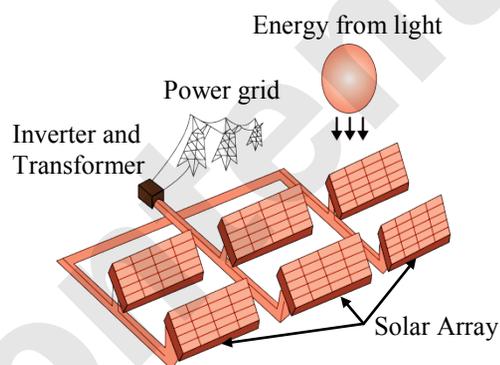
- i. In solar panels, many solar cells are connected in series and parallel combinations to generate the required current and potential difference.
- ii. In series combination of solar cells, the potential difference is the addition of the potential difference of individual solar cells while the current is equal to the current from an individual cell.
- iii. In parallel combination of solar cells, the current is the addition of the current of individual solar cells while the potential difference is equal to the potential difference from an individual cell.
- iv. Many such solar panels are then connected in series to form a solar string and many such solar strings are further connected in parallel to form a solar array.
- v. Thus, by connecting many solar panels in series and in parallel combinations, the required amount of energy can be generated.

21. With the help of a diagram, explain how power is generated in a solar photovoltaic power station and fed into electricity distribution network. [3 Marks]

Ans:

- i. Solar photovoltaic cells which directly convert solar radiation energy into electrical energy of mW capacity are connected in required series and parallel combinations to form a solar panel.

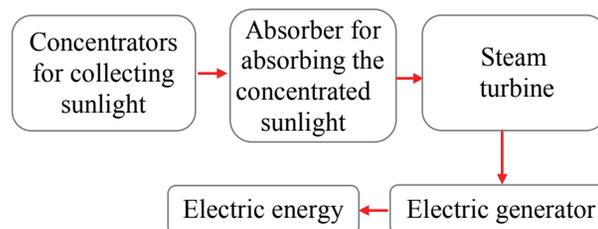
- ii. Many solar panels are connected in series to form a solar string and many such solar strings are further connected in parallel to form a solar array.
- iii. Many solar arrays together generate power of MW capacity which is in the form of D.C.
- iv. The D.C. power generated is converted to A.C. power using an inverter.
- v. A transformer is used to transform the voltage and current levels of the generated power and is then fed into the electricity distribution network.



22. With the help of a flow chart, explain the working of a solar thermal power plant. [3 Marks]

Ans:

- i. In solar thermal power plant, solar energy from sun is converted to electrical energy.
- ii. A solar thermal power plant consists of a solar panel, a condenser, a turbine, a generator, pump and a cooling tower.
- iii. The solar panel consists of many reflectors that reflect and concentrate solar radiations on absorbers; thus, converting the solar energy into heat energy.
- iv. Using this heat energy, steam is generated.
- v. This steam is used to drive the turbine which in turn rotates the generator and electrical energy is produced.
- vi. The steam is converted back to water with the help of the condenser and cooling tower. Once the steam is condensed back to water, it is re-circulated back to the solar panel.



Different stages in solar thermal power plant



23. If a silicon solar cell of dimension 1 cm^2 generates current of about 30 mA and potential difference of about 0.5 V. Find the current and potential difference generated by a silicon solar cell of dimension 1000 cm^2 .

[2 Marks]

Ans: For a silicon solar cell of dimension 1000 cm^2 ,
Current generated = $30 \text{ mA/cm}^2 \times 1000 \text{ cm}^2$

$$= 30000 \text{ mA} = 30 \text{ A}$$

Since, potential difference available from a solar cell is independent of its area,

Potential difference generated = 0.5 V.

- *24. What are the advantages and limitations of solar energy? [2 Marks]

Ans:

Advantages of solar energy:

- Solar energy is a renewable source of energy.
- Solar energy does not cause pollution.

Limitations of solar energy:

- Solar energy is difficult to employ.
- Solar energy cannot be used at night or on cloudy days.
- Solar energy is not available uniformly during the day time and at all the places on the earth.

- *25. Other than thermal power plant, which power plants use thermal energy for power generation? In what different ways is the thermal energy obtained? [2 Marks]

Ans: Apart from thermal power plant; power plants based on nuclear energy and solar thermal power plants use thermal energy for power generation.

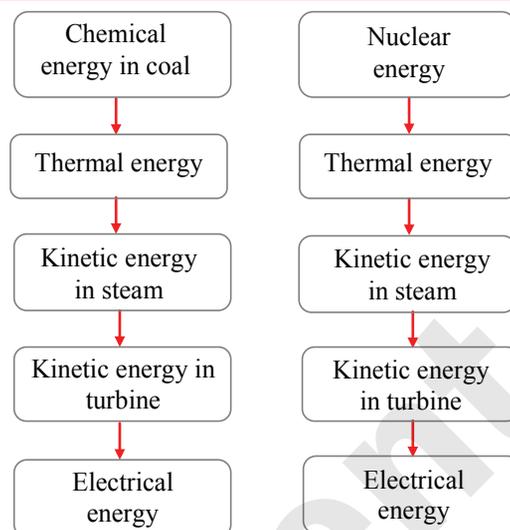
Different ways to obtain thermal energy:

- In thermal power plants, coal is burned to obtain the thermal energy.
- In power plants based on nuclear energy, fission of nuclei of atoms like uranium or plutonium is used to generate the thermal energy.
- In solar thermal power plants, the thermal energy is obtained from the solar radiations.

- *26. Which type/types of power generation involve maximum number of steps of energy conversion? In which power generation is the number minimum? [2 Marks]

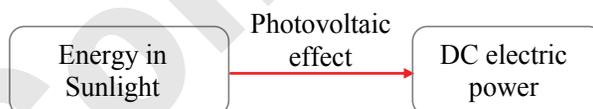
Ans:

- The maximum number of steps of energy conversion are involved in thermal power plant and nuclear power plant.



Energy transformation in thermal power plant **Energy transformation in nuclear power plant**

- The minimum number of steps of energy conversion are involved in solar photovoltaic cell.



- *27. Explain the following sentences.

[2 Marks each]

- Energy obtained from fossil fuels is not green energy.

Ans:

- Energy sources which are unlimited and environment friendly are called as green energy sources and energy generated from these sources is called green energy.
- Burning of fossil fuels like coal, natural gas leads to emission of harmful gases like carbon monoxide, nitrogen dioxide causing air pollution.
- The reserves of fossil fuels are limited which are going to get depleted in the future.
- Thus, as the generation of energy from fossil fuels is not environmental friendly and the sources of fossil fuels being limited, the energy obtained from fossil fuels is not green energy.

- Saving energy is the need of the hour.

Ans:

- Due to high energy consumption, the existing sources of energy are depleting rapidly and will become scarce in the future.
- Saving energy will reduce the burning of fossil fuels, thus minimizing air pollution, water pollution and production of harmful gases that lead to environmental hazards such as global warming and acid rain.

Hence, saving energy is the need of the hour.

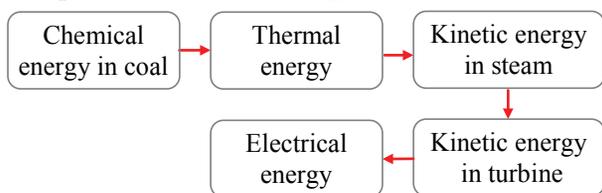


***28. Explain with diagram step-by-step energy conversion in [3 Marks each]**

i. Thermal power plant

Ans:

- In a thermal power plant, coal is used as fuel.
- Conversion of chemical energy in coal to thermal energy:** When the coal is burned, the chemical energy in coal is converted to thermal energy.
- Conversion of thermal energy to kinetic energy in steam:** This thermal energy is used to heat the water present in a boiler. Steam of very high temperature and pressure is generated and directed on the blades of the turbine.
- Conversion of kinetic energy in steam to kinetic energy in turbine:** The kinetic energy produced in the steam is then used to drive the turbine.
- Conversion of kinetic energy in turbine to electrical energy:** The turbine rotates the generator connected to it which in turn produces electrical energy.

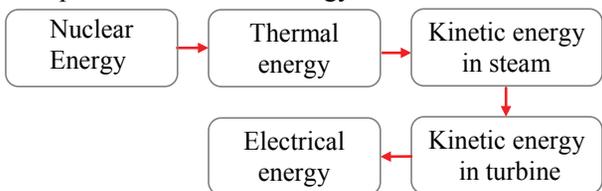


Energy transformation in thermal power plant

ii. Nuclear power plant

Ans:

- In a nuclear power plant, uranium or plutonium are used as fuel.
- Conversion of nuclear energy to thermal energy during nuclear fission process:** During the fission of nuclei of atoms like uranium or plutonium, the nuclear energy is converted to thermal energy.
- Conversion of thermal energy to kinetic energy in steam:** This thermal energy is used to heat the water present in a boiler. Steam of very high temperature and pressure is generated and directed on the blades of the turbine.
- Conversion of kinetic energy in steam to kinetic energy in turbine:** The kinetic energy produced in the steam is then used to drive the turbine.
- Conversion of kinetic energy in turbine to electrical energy:** The turbine rotates the generator connected to it which in turn produces electrical energy.

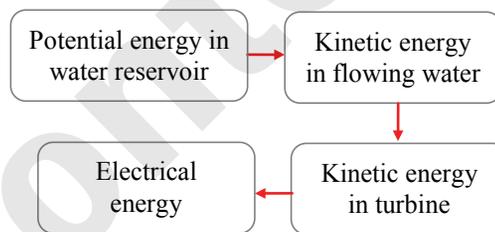


Energy transformation in nuclear power plant

iii. Hydroelectric power plant

Ans:

- In a hydroelectric power plant, water reservoir is used as the source of energy.
- Conversion of potential energy from water to kinetic energy:** The potential energy in water stored in a water reservoir like a dam is converted to kinetic energy of water by making it flow to the bottom of the dam.
- Conversion of kinetic energy in water to kinetic energy in turbine:** Fast flowing water is brought from the dam to the turbine at the bottom of the dam. The kinetic energy of the flowing water drives the turbine.
- Conversion of kinetic energy in turbine to electrical energy:** The turbine rotates the generator connected to it which in turn produces electrical energy.

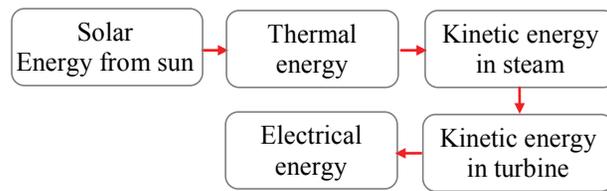


Energy transformation in hydroelectric power plant

iv. Solar thermal power plant

Ans:

- In a solar thermal power plant, sunlight is used as the source of energy.
- Conversion of solar energy from sun to thermal energy:** The solar energy from the solar radiations is converted into heat energy with the help of solar panels.
- Conversion of thermal energy to kinetic energy in steam:** This heat energy is used to generate steam which is directed on the blades of the turbine.
- Conversion of kinetic energy in steam to kinetic energy in turbine:** The kinetic energy produced in the steam is then used to drive the turbine.
- Conversion of kinetic energy in turbine to electrical energy:** The turbine rotates the generator connected to it which in turn produces electrical energy.



Energy transformation in solar thermal power plant



29. Let's Think. (Textbook page no. 52)

Which electricity generation process is eco-friendly and which not? [2 Marks]

Ans:

- i. Electricity generation processes using fossil fuels such as coal, natural gas and nuclear fuels like uranium and plutonium are not eco-friendly.
- ii. Electricity generation from green energy sources like water reservoirs, wind, sunlight, bio-fuels etc., are eco-friendly.

Give reasons [2 Marks each]

***1. The construction of turbine is different for different types of power plants.**

Ans:

- i. In a power plant, a turbine is used to rotate the generator which produces the energy.
- ii. To drive the turbine, we need an energy source.
- iii. The construction of the turbine in a power plant depends on the type of energy source which is being used to rotate the turbine. For example: steam turbine is used in thermal power plant where steam is used to rotate the turbine while wind turbine with large fins is used in electricity generation using wind energy.

Hence, depending on the energy source the construction of turbine is different for different types of power plants.

2. Let's Think. (Textbook page no. 49)

i. Why is the energy in coal called as chemical energy?

Ans:

- a. Chemical energy is energy stored in the bonds of chemical compounds and often on combustion comes out in the form of thermal energy.
- b. During combustion of coal, energy stored in the bonds of coal is released in the form of heat.

Hence, energy in coal is called as chemical energy.

ii. Why steam is used to rotate the turbine?

Ans:

- a. Steam is cheap to generate and easy to handle.
- b. Steam can be converted back to water and re-circulated for usage.
- c. Steam is adaptable to varied conditions. Due to all these reasons, steam is most commonly used to rotate turbines.

***3. It is absolutely necessary to control the fission reaction in nuclear power plants.**

Ans:

- i. Large amount of energy is generated in a matter of seconds in a fission reaction. If the fission reaction is not controlled, it can prove fatal.

ii. Uncontrolled fission reaction may lead to the emission of harmful radiations.

iii. It can also lead to the meltdown of the nuclear power plant.

Thus, it is absolutely necessary to control the fission reaction in nuclear power plants.

***4. Hydroelectric energy, solar energy and wind energy are called renewable energies.**

[Mar, Dec 2020]

OR

Hydroelectric energy, solar energy and wind energy are called renewable energies. Why?

[July 2019]

Ans:

- i. The sources of energy which are being produced continuously in nature and are inexhaustible, i.e., they are always available for use are called renewable sources of energy.
- ii. Hydroelectric energy, solar energy, wind energy are produced from energy sources like water, sunlight and wind respectively that are produced continuously in nature and will not get depleted.

Thus, hydroelectric energy, solar energy and wind energy are called renewable energies.

5. Wind turbines are usually set up on wind shores.

Ans:

- i. Wind turbines are set up at a particular location based on the wind velocity available at that location.
- ii. Wind velocity differs from location-to-location and depends on many geographical factors.
- iii. Wind velocity is generally high on sea-shores, which is an ideal condition for a wind turbine.

Hence, wind turbines are usually set up on wind shores.

***6. It is possible to produce energy from mW to MW using solar photovoltaic cells.**

Ans:

- i. Solar photovoltaic cells which have energy producing capacity of mW, are connected in required series and parallel combinations to form a solar panel.
- ii. Many solar panels are connected in series to form a solar string and many solar strings are connected in parallel to form a solar array which has energy producing capacity of MW.
- iii. Thus, with the required series and parallel combination of solar photovoltaic cells to form solar panels, solar strings and solar arrays, it is possible to produce energy from mW to MW capacity.



Distinguish between [2 Marks each]

***1. Thermal electricity generation and solar thermal electricity generation**

Ans:

	Thermal electricity generation	Solar thermal electricity generation
i.	For thermal electricity generation, non-renewable energy source i.e., coal is used.	For solar thermal electricity generation, renewable energy resource i.e., sunlight is used.
ii.	Thermal electricity generation causes air pollution.	Solar thermal electricity generation does not cause air pollution.
iii.	Heat energy obtained from burning fossil fuels is used to generate electricity.	Heat energy obtained from solar radiations is used to generate electricity.
iv.	Chemical energy of coal is converted into electrical energy through various stages.	Heat energy of sunlight is converted into electrical energy through various stages.
v.	Energy generated is not green energy.	Energy generated is green energy.

***2. Conventional and non-conventional sources of energy**

Ans:

	Conventional sources of energy	Non-conventional sources of energy
i.	Conventional sources of energy are limited and exhaustible.	Non-conventional sources of energy are abundant and inexhaustible.
ii.	They cause pollution.	They cause little or no pollution.
iii.	Fuels produced from conventional sources are comparatively expensive.	Fuels produced from non - conventional sources are comparatively cheaper.
iv.	Conventional sources do not produce green energy.	Non-conventional sources produce green energy.
	Example: fossil fuels such as coal, natural gas etc.	Example: wind energy, solar energy, etc.

Complete the given table [3 Marks]

1. Make a table based on forms of energy and corresponding devices:

	Forms of Energy	Devices
a.	Electric	_____
b.	Mechanical	Sewing machine, Bicycle
c.	Thermal	_____
d.	_____	Solar cooker, Solar heater

[Mar 2020]

Ans:

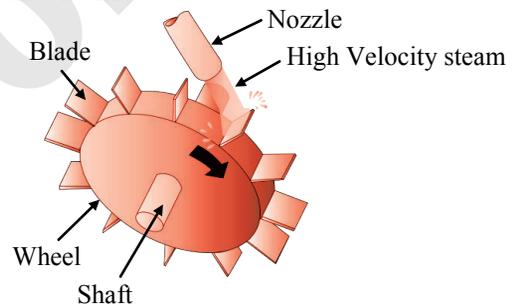
	Forms of Energy	Devices
a.	Electric	Electric Fan, Television
b.	Mechanical	Sewing machine, Bicycle
c.	Thermal	Thermal power station turbine, stove
d.	Solar	Solar cooker, Solar heater

Questions based on diagram

1. Draw neat and labelled diagrams.

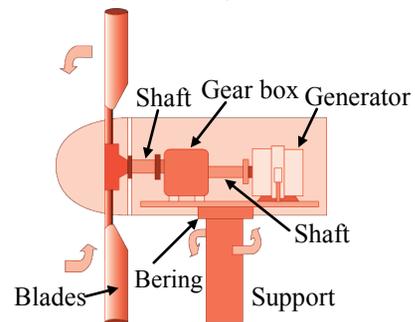
i. Steam turbine

Ans:



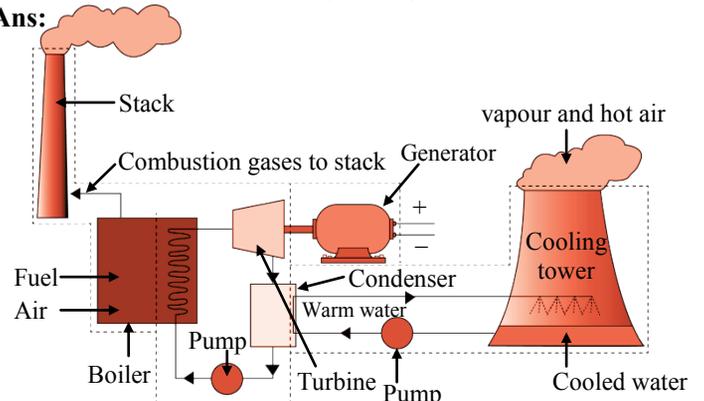
ii. Wind turbine (wind mill)

Ans:



iii. Schematic for thermal power plant

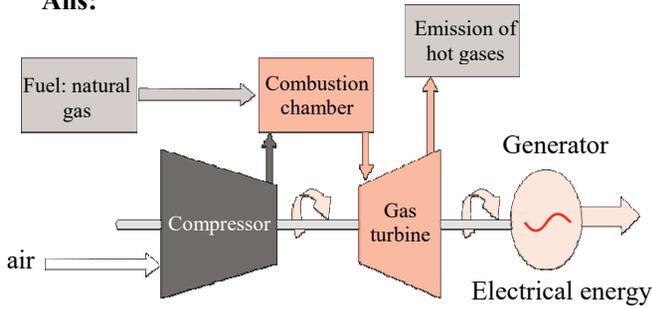
Ans:





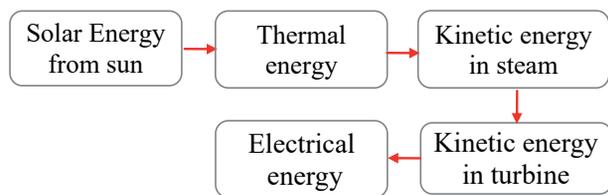
iv. Schematic for power plant based on natural gas

Ans:



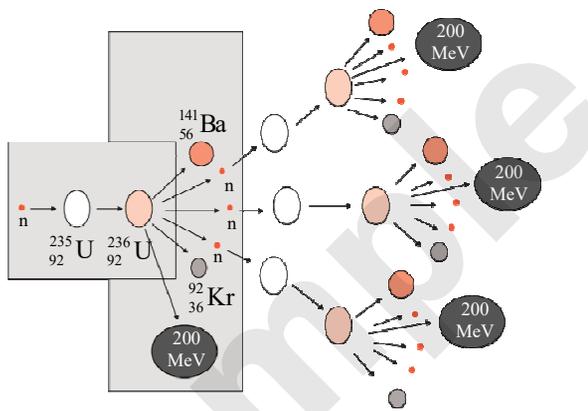
*v. Energy transformation in solar thermal electric energy generation.

Ans:



Energy transformation in Solar thermal power plant

2. Identify the process shown in figure and name it. [Mar 2019][1 Mark]

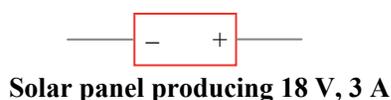


Ans: The process shown in the diagram is that of nuclear fission where a neutron is bombarded on an atom of Uranium – 235.

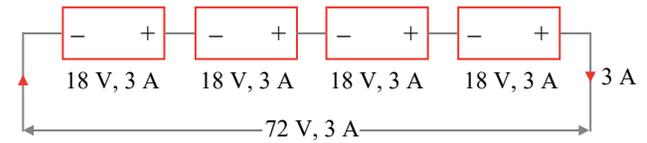
*3. One solar panel produces a potential difference of 18 V and current 3 A. Describe how you can obtain a potential difference of 72 volts and current of 9 A with a solar array using solar panel. You can use sign of a battery for a solar panel. [3 Marks]

Ans:

i. A solar panel producing potential difference of 18 V and current of 3A is represented below.

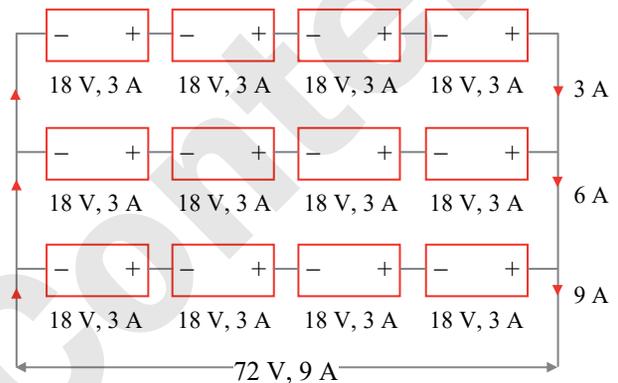


ii. Four solar panels producing 18 V and 3 A should be connected in series to form a solar string producing potential difference of 72 V and current of 3 A.



Solar string producing 72 V, 3 A

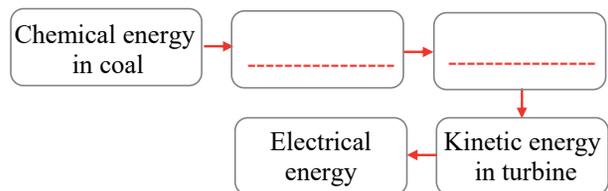
iii. The solar string producing 72 V and 3 A is connected in parallel with two more solar strings producing 72 V and 3 A to form a solar array producing a potential difference of 72 V and current of 9 A.



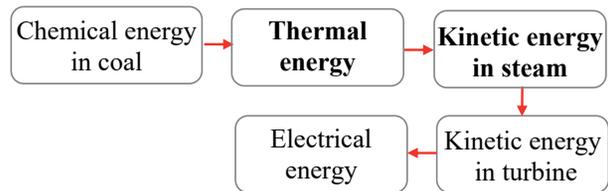
Solar array producing 72 V, 9 A

4. Complete the flow chart and explain the energy transformation. [3 Marks each]

i.



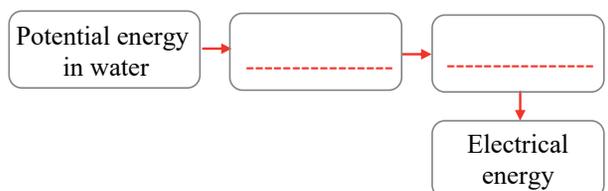
Ans:



Explanation of energy transformation:

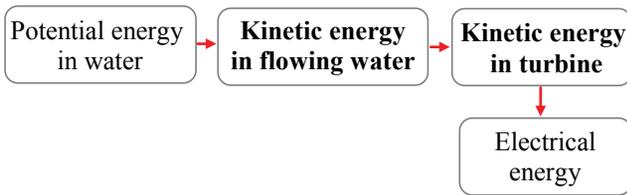
Refer Answer the following: Q.28 (i).

ii.



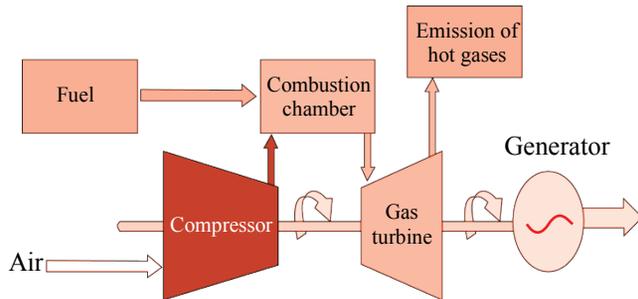


Ans:



Explanation of energy transformation:
Refer Answer the following: Q.28 (iii).

5. Observe the diagram and answer the questions:



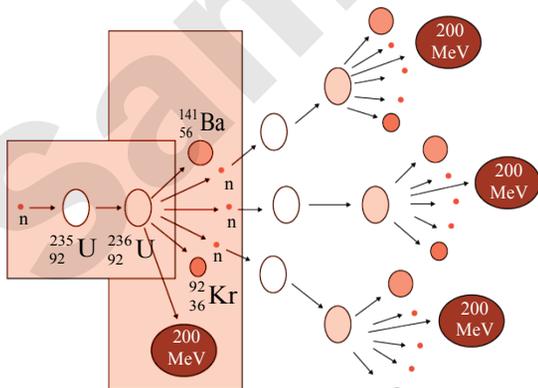
- Which energy is generated from the power plant?
- State its source.
- Which is more eco-friendly – power generation from coal or power generation from natural gas? Why?

[Mar 2019] [3 Marks]

Ans:

- The energy generated from the power plant is electrical energy.
- Natural gas is the source of the power plant.
- Power generation from natural gas is more eco-friendly than power generation from coal. As natural gas does not contain sulphur, burning of natural gas results in less pollution and is thus more eco-friendly.

6. Observe the following diagram and answer the questions. [3 Marks]

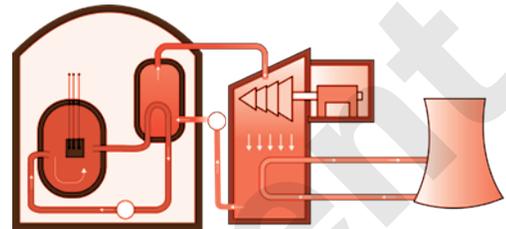


- Atom of which element is bombarded with a neutron?
- Into atoms of which elements does the unstable isotope convert?
- What is the above reaction known as? Which power plant makes use of this reaction?

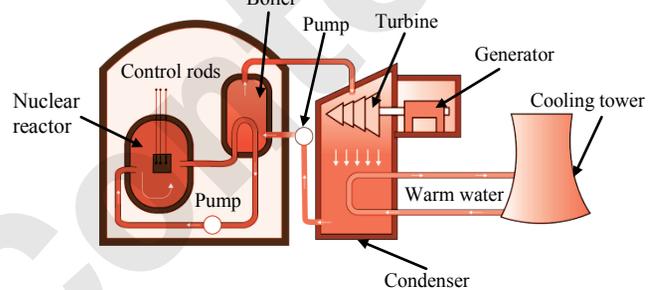
Ans:

- Atom of Uranium-235 is bombarded with a neutron.
- The unstable isotope converts into atoms of Barium and Krypton.
- The above reaction is known as nuclear fission. Nuclear power plant makes use of this reaction.

7. Label the following diagram and explain the power generation in the plant. [3 Marks]

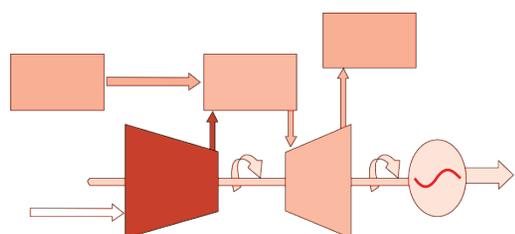


Ans:



- In a nuclear power plant, nuclear energy in the nuclei of atoms like uranium or plutonium is converted to electrical energy.
- A nuclear power plant consists of a nuclear reactor, a boiler, a condenser, a turbine, a generator and a cooling tower
- In the nuclear reactor, nuclear fission of nuclei to atoms like uranium or plutonium occurs. Control rods are used to speed up or slow down the chain reaction.
- Using the thermal energy released due to the controlled chain reaction, Steam of very high temperature and pressure is generated in the boiler.
- The steam is used to drive the turbine which in turn rotates the generator and electrical energy is produced.
- The steam is converted back to water with the help of the condenser and cooling tower. Once the steam is condensed back to water, it is re-circulated back to the boiler.

8. Observe the following diagram and answer the questions. [5 Marks]

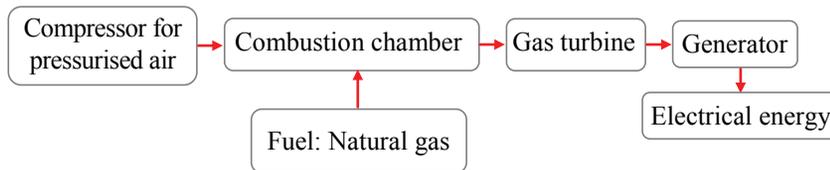




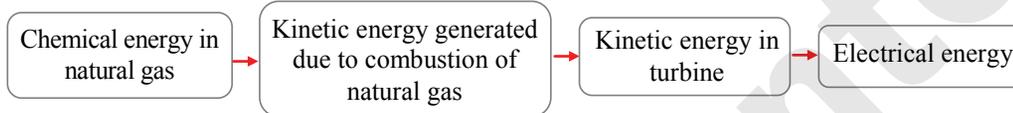
- i. The schematic of which power plant is shown in diagram?
- ii. What is the function of the combustion chamber in the plant?
- iii. What is the function of the compressor in the plant?
- iv. Draw the flow chart showing the generation of electricity in the power plant.
- v. Draw the flow chart for the transformation of energy in the power plant.

Ans:

- i. The schematic of power generation based on energy of natural gas is shown in the given diagram.
- ii. The combustion chamber is used to burn the natural gas in the presence of pressurized air.
- iii. The compressor is used to introduce pressurized air in the combustion chamber.
- iv. Flow chart showing the generation of electricity in the power plant is as follows:



- v. Flow chart showing the transformation of energy in the power plant is as follows:



- 9. Draw schematic of power plant based on natural gas and answer the following questions:**

- i. At which place natural gas power plant is situated in Maharashtra?
- ii. How is pollution reduced in natural gas based power plant?
- iii. Give two examples of eco-friendly electricity process.

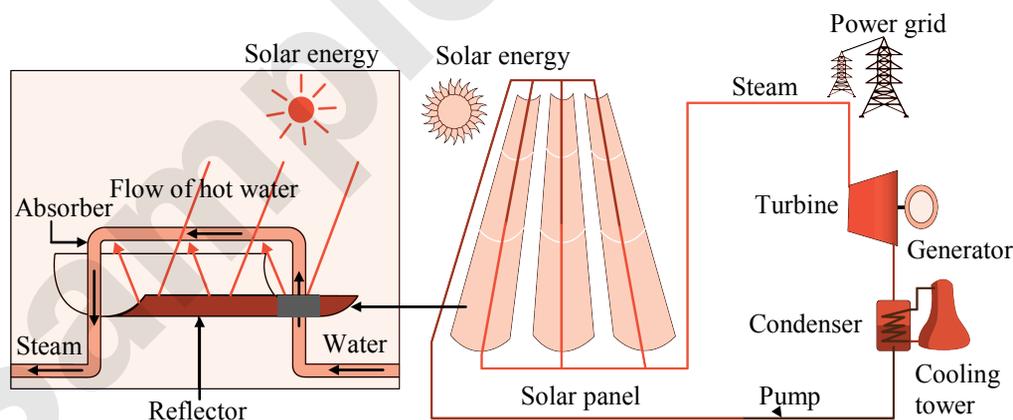
[July 2019]/[5 Marks]

Ans: Refer Question based on diagram: Q.1(iv) for diagram of power plant based on natural gas.

- i. Natural gas power plant is situated in Anjavel in Maharashtra.
- ii. As natural gas does not contain sulphur, burning of natural gas results in less pollution.
- iii. Electricity generation from wind and sunlight are two examples of eco-friendly electricity process.

- *10. Draw a schematic diagram of solar thermal electric energy generation.**

Ans:



Apply your Knowledge

- 1. Can you recall? (Textbook page no. 47)**

- i. What is energy?

Ans: The capacity of a body to perform work is called its energy.

- ii. What are different types of energy?

Ans: The different types of energy are potential energy and kinetic energy.

- iii. What are different forms of energy?

Ans: Different forms of energy: mechanical energy, heat energy, light energy, sound energy and chemical energy.



2. Let's discuss (*Textbook page no. 47*)
Make a list of the work that we do in our day-to-day life using energy. Which forms of energy do we use to do this work? Discuss with your friends.

Ans:

- i. Heat energy is used to cook food.
- ii. Electrical energy is used for running electrical appliances such as fan, TV, computer, etc.
- iii. Sound energy is generated using chemical energy stored in our body while speaking.
- iv. Kinetic energy is used for running, cycling etc.

[*Note: Students are expected to use the above information as reference to make their own answer and discuss.*]

3. Make a table (*Textbook page no. 47*)
Make a table based on forms of energy and corresponding devices.

Ans:

Instrument	Converts energy from	Converts energy to
Electric heater	Electrical energy	Heat energy
Loud speaker	Electrical energy	Sound energy
Microphone	Sound energy	Electrical energy
Solar cell	Light energy	Electrical energy
Electric lamp	Electrical energy	Light energy
Generator	Mechanical energy	Electrical energy

[*Note: Students are expected to add to the list more devices known to them.*]

4. Can you tell? (*Textbook page no. 47*)
i. Where do we use electrical energy in our day-to-day life?

Ans: We use electrical energy in working of various appliances such as fan, lamp, mixer, television, radio, refrigerator, washing machine, iron, etc.

5. Use of ICT (*Textbook page no. 49*)
Prepare a presentation about thermal power plant using computerized presentation, animation, video, pictures, etc. Send it to others and upload on You Tube.

[*Students are expected to perform the above activity on their own.*]

6. Internet is my friend. (*Textbook page no. 51*)
Complete the table given on page 51 of your textbook for some important nuclear power plants in India.

Ans:

Place	State	Capacity (MW)
Kudankulam	Tamil nadu	2000
Tarapur	Maharashtra	1400
Rawatbhata	Rajasthan	1180
Kaiga	Karnataka	880

7. Intext Question. (*Textbook page no. 54*)
It has always been a point of debate whether the hydro-electricity is environment friendly or not. What is your opinion about it?

[*Students are expected to write their personal opinion based on the advantages and disadvantages given in Answer the following Q.12*]

8. Find out (*Textbook page no. 55*)
What is lake tapping? Why it takes place?

Ans: Lake tapping:

- i. Lake tapping is a process in which a tunnel is dug out near the bottom of a lake upto the water-rock contact of the lake. The final layer of the rock is then blasted with the help of dynamite which provides the inflow of water into the tunnel with more speed.
- ii. It is done to facilitate the generation of electricity when the water level goes down in peak summer.
- iii. Thus, it also helps the areas suffering with drought due to scarcity of water during summer.

9. Get information. (*Textbook page no. 56*)
Get information about major wind-power stations in India and their capacity. Make a table of their location, state and their power capacity in MW.

Ans:

Power plant	Location	State	Capacity (MW)
Muppandal wind farm	Kanyakumari	Tamil Nadu	1500
Jaisalmer wind park	Jaisalmer	Rajasthan	1064
Dhalgaon wind farm	Sangli	Maharashtra	278
Damanjodi wind power plant	Damanjodi	Odisha	99
Acciona tuppadahalli	Chitra durga	Karnataka	56
Puthlur RCI	Puthlur	Andhra Pradesh	20
Lamda Danida	Lamda	Gujarat	15

[*Note: Students are expected to use the above information as reference and gather more information.*]

**10. Find out (Textbook page no. 58)**

Gather information about major solar photovoltaic power generating plants and their capacity in India.

Ans:

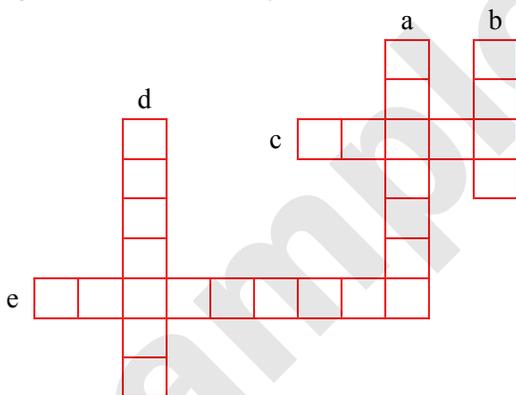
Power plants	State	Capacity (MW)
Kamuthi Solar Power Project	Tamil Nadu	648
Sakri Solar Plant	Maharashtra	125
Welspun Solar MP Project	Madhya Pradesh	151
Dhirubhai Ambani Solar Park	Rajasthan	40
Bitta Solar Power Plant	Gujarat	40

[Note: Students are expected to use the above information as reference and gather more information.]

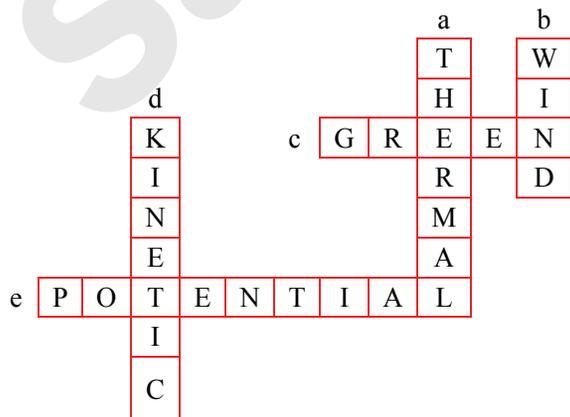
***11. Puzzle:**

Solve the following crossword puzzle.

- Maximum energy generation in India is done using _____ energy.
- _____ energy is a renewable source of energy.
- Solar energy can be called _____ energy.
- _____ energy of wind is used in wind mills.
- _____ energy of water in dams is used for generation of electricity.



Ans:

***12. Project:**

- Gather information about solar light, solar water heating system and solar cooker.

Ans:

Solar light: A solar light (solar lamp) converts the solar radiation into electrical energy using the photovoltaic effect. It consists of an LED lamp, solar panel, solar controller and a battery.

Solar water heating system: A solar water heating system uses sunlight for water heating. It consists of a thermal collector which captures the heat from the sun and uses it to heat the water.

Solar cooker: Solar cooker is a device which can cook food by using solar energy and converting it into heat energy. It works on the principle that black surface absorbs more heat than white or a reflecting surface.

[Note: Students are expected to refer the accompanying QR code for more detailed information about solar light, solar heating system and solar cooker.]



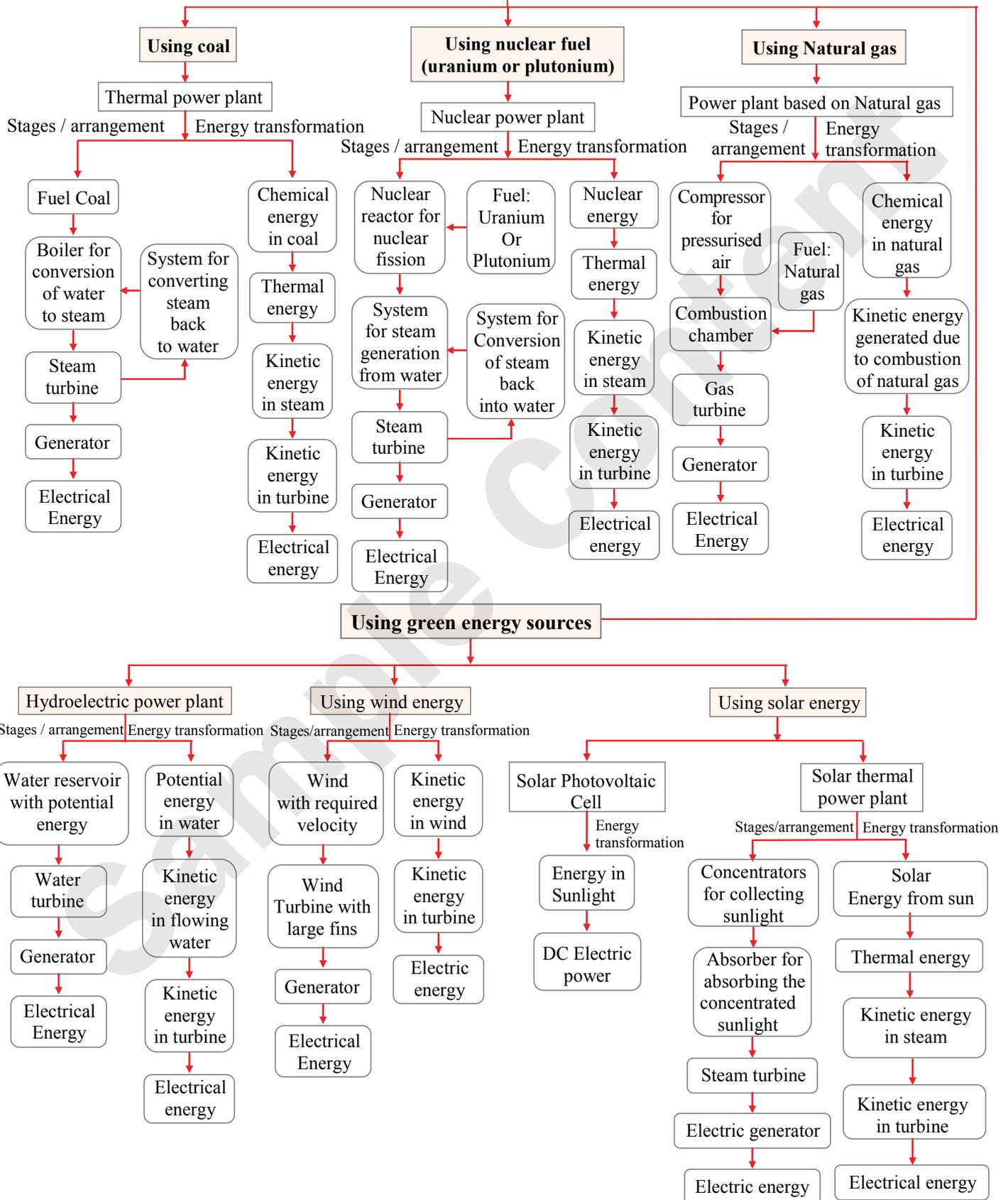
- Gather information about a power plant near your locality by visiting the plant.

[Students are expected to perform the above activity on their own.]



Memory Map

Electrical Energy generation





Chapter Assessment

[Total Marks: 25]

Q.1. (A) Choose the correct alternative.

[4]

- i. In solar thermal power plant, many reflectors reflect and concentrate solar radiation on _____.
- (A) condenser (B) generator
(C) absorbers (D) power grid
- ii. Which of the following is not a green energy source?
- (A) wind (B) sunlight
(C) bio-fuels (D) natural gas
- iii. If two solar cells are connected in parallel, then
- (A) current remains the same while the potential difference of individual solar cell is added.
(B) current and potential difference both remain the same.
(C) potential difference remains the same while current of individual solar cell is added.
(D) current and potential difference both of individual solar cell are added.
- iv. Nitrogen dioxide generated due to burning of fuels like coal, diesel, petrol etc. causes _____.
- (A) water pollution (B) acid rain
(C) soot particles (D) corrosion

(B) Answer the following:

[4]

- i. State true or false. If false, write the correct sentence.
In thermal solar power plant, solar energy is directly converted into electrical energy.
- ii. Match the column:

	Column I		Column II
a.	Combustion chamber	1.	used to introduce pressurised air
b.	Condenser	2.	used to burn fuel in presence of air
		3.	used to convert steam back to water

- iii. Complete the analogy:
Group of solar cells : solar panel :: Group of solar strings : _____.
- iv. Name the following.
Elements whose atoms are used for nuclear fission in nuclear power plant.

Q.2 (A) Give scientific reasons: (Attempt any one)

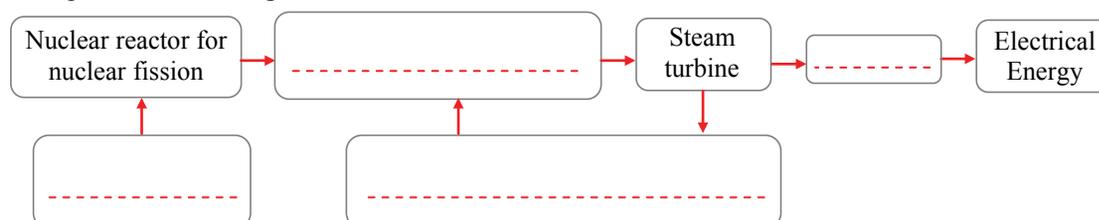
[2]

- i. Why are hydroelectric energy, solar energy and wind energy called renewable energies?
- ii. The construction of turbine is different for different types of power plants.

(B) Answer the following (Attempt any two)

[4]

- i. State any one advantage and disadvantage associated with hydroelectric power plant.
- ii. Explain how a wind turbine is used for energy generation using wind energy.
- iii. Complete the following flowchart.

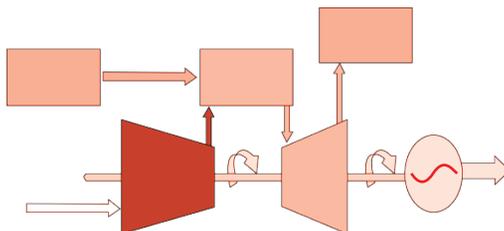




Q.3 Answer the following: (Attempt any two)

[6]

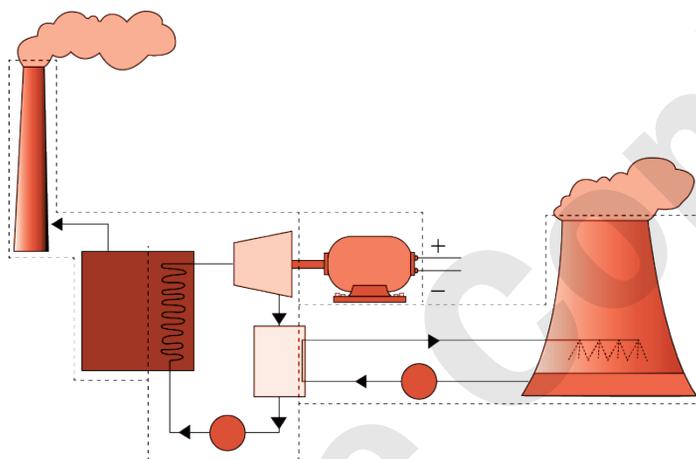
- i. With the help of a flow chart, explain the working of a solar thermal power plant.
- ii. One solar panel produces a potential difference of 20 V and current of 5 A. Describe with the help of diagrams, how can you obtain a potential difference of 40 V and current of 20 A with a solar array using solar panels. Use sign of a battery for a solar panel.
- iii. Label the following diagram and explain step-by-step energy conversion in the plant.



Q.4 Answer the following: (Attempt any one)

[5]

i.



- a. The schematic of which power plant is shown in diagram?
- b. What is the fuel used in the plant?
- c. State any one problem caused due to power generation using this power plant.
- d. Draw the flow chart showing the generation of electricity in the power plant.
- e. Draw the flow chart for the transformation of energy in the power plant.
- ii. With the help of a neat labelled schematic diagram, explain energy generation in nuclear power plant.

Download the answers of the Chapter Assessment by scanning the given Q.R. Code.





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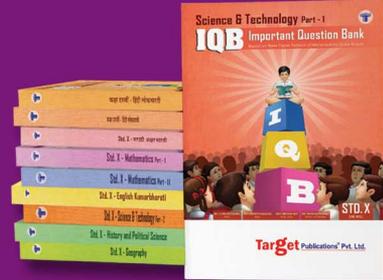
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