

SRM VALLIAMMAI ENGINEERING COLLEGE

(Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK



VII SEMESTER

OEE101 RENEWABLE ENERGY SOURCES

Regulation – 2023

Academic Year 2026-2027 ODD

Prepared by

Dr.S.Padhmanabha Iyappan, Associate Professor

Mr.V.Sudhagar, Assistant Professor (Sr. G)

Ms. R.V.Preetha, Assistant Professor (Sr. G)



SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203.



DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

QUESTION BANK

SUBJECT & SUBJECT CODE: OEE101 RENEWABLE ENERGY SOURCES

SEM / YEAR: VII/ IV

UNIT-I ENERGY SCENARIO

Indian energy scenario in various sectors – domestic, industrial, commercial, agriculture, transportation and others – Present conventional energy status – Present renewable energy status- Potential of various renewable energy sources-Global energy status-Per capita energy consumption - Future energy plans

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Define energy scenario.	BTL1	Remembering	CO1
2.	List sectors of energy consumption in India.	BTL1	Remembering	CO1
3.	What is conventional energy?	BTL1	Remembering	CO1
4.	What is renewable energy?	BTL1	Remembering	CO1
5.	State two advantages of renewable energy.	BTL1	Remembering	CO1
6.	What is per capita energy consumption?	BTL1	Remembering	CO1
7.	Mention two conventional energy sources.	BTL1	Remembering	CO1
8.	Mention two renewable energy sources.	BTL1	Remembering	CO1
9.	What is energy security?	BTL1	Remembering	CO1
10.	What is sustainable development?	BTL1	Remembering	CO1
11.	List energy-consuming domestic appliances.	BTL1	Remembering	CO1
12.	State the importance of energy planning.	BTL1	Remembering	CO1
13.	What is commercial energy consumption?	BTL1	Remembering	CO1
14.	What is industrial energy consumption?	BTL2	Understanding	CO1
15.	What is agricultural energy consumption?	BTL2	Understanding	CO1
16.	Mention transportation energy sources.	BTL2	Understanding	CO1
17.	State India's renewable energy status.	BTL2	Understanding	CO1
18.	What is global energy status?	BTL2	Understanding	CO1
19.	Define energy demand.	BTL2	Understanding	CO1
20.	Define energy supply.	BTL2	Understanding	CO1
21.	List future energy challenges.	BTL2	Understanding	CO1
22.	State two benefits of energy conservation.	BTL2	Understanding	CO1

23.	What is carbon footprint?	BTL2	Understanding	CO1
24.	Differentiate renewable and non-renewable energy sources.	BTL2	Understanding	CO1

PART-B

1.	Explain the Indian energy scenario.	(16)	BTL3	Applying	CO1
2.	Analyze energy consumption patterns in different sectors.	(16)	BTL3	Applying	CO1
3.	Evaluate conventional and renewable energy resources.	(16)	BTL3	Applying	CO1
4.	Discuss future energy plans for India.	(16)	BTL3	Applying	CO1
5.	Analyze challenges in energy security.	(16)	BTL3	Applying	CO1
6.	Compare Indian and global energy scenarios.	(16)	BTL3	Applying	CO1
7.	Assess renewable energy potential in India.	(16)	BTL3	Applying	CO1
8.	Discuss measures for sustainable energy development.	(16)	BTL3	Applying	CO1
9.	Analyze the impact of population on energy demand.	(16)	BTL3	Applying	CO1
10.	Evaluate the role of renewable energy in reducing emissions.	(16)	BTL4	Analyzing	CO1
11.	Discuss strategies for energy conservation.	(16)	BTL4	Analyzing	CO1
12.	Analyze sector-wise energy utilization.	(16)	BTL4	Analyzing	CO1
13.	Evaluate future energy policies.	(16)	BTL4	Analyzing	CO1
14.	Discuss energy transition pathways.	(16)	BTL4	Analyzing	CO1
15.	Analyze barriers to renewable energy adoption.	(16)	BTL4	Analyzing	CO1
16.	Evaluate the significance of per capita energy consumption.	(16)	BTL4	Analyzing	CO1
17.	Discuss global energy trends.	(16)	BTL4	Analyzing	CO1

UNIT-II SOLAR ENERGY

Solar radiation – Measurements of solar radiation and sunshine – Solar spectrum - Solar thermal collectors – Flat plate and concentrating collectors – Solar thermal applications – Solar thermal energy storage – Fundamentals of solar photo voltaic conversion – Solar cells – Solar PV Systems – Solar PV applications.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Define solar radiation.	BTL1	Remembering	CO2
2.	What is solar spectrum?	BTL1	Remembering	CO2
3.	List methods of measuring solar radiation.	BTL1	Remembering	CO2
4.	Define sunshine duration.	BTL1	Remembering	CO2
5.	What is a flat plate collector?	BTL1	Remembering	CO2

6.	What is a concentrating collector?	BTL1	Remembering	CO2
7.	State one solar thermal application.	BTL1	Remembering	CO2
8.	What is solar thermal storage?	BTL1	Remembering	CO2
9.	Define photovoltaic effect.	BTL1	Remembering	CO2
10.	What is a solar cell?	BTL1	Remembering	CO2
11.	State the function of an inverter.	BTL1	Remembering	CO2
12.	What is a solar PV system?	BTL1	Remembering	CO2
13.	List components of a PV system.	BTL1	Remembering	CO2
14.	What is solar constant?	BTL2	Understanding	CO2
15.	Mention advantages of solar energy.	BTL2	Understanding	CO2
16.	What is solar thermal collector efficiency?	BTL2	Understanding	CO2
17.	Define direct radiation.	BTL2	Understanding	CO2
18.	Define diffuse radiation.	BTL2	Understanding	CO2
19.	State applications of solar PV.	BTL2	Understanding	CO2
20.	What is net metering?	BTL2	Understanding	CO2
21.	What is solar water heating?	BTL2	Understanding	CO2
22.	What is solar drying?	BTL2	Understanding	CO2
23.	Define solar energy storage.	BTL2	Understanding	CO2
24.	Differentiate solar thermal and solar PV systems.	BTL2	Understanding	CO2

PART-B

1.	Explain solar radiation measurement techniques.	(16)	BTL3	Applying	CO2
2.	Analyze the working of flat plate collectors.	(16)	BTL4	Analyzing	CO2
3.	Compare flat plate and concentrating collectors.	(16)	BTL3	Applying	CO2
4.	Discuss solar thermal applications.	(16)	BTL4	Analyzing	CO2
5.	Analyze thermal energy storage methods.	(16)	BTL3	Applying	CO2
6.	Explain photovoltaic conversion principles.	(16)	BTL4	Analyzing	CO2
7.	Analyze solar cell construction and operation.	(16)	BTL3	Applying	CO2
8.	Design a solar PV system for a household.	(16)	BTL4	Analyzing	CO2
9.	Evaluate solar PV applications.	(16)	BTL3	Applying	CO2
10.	Analyze factors affecting PV performance.	(16)	BTL4	Analyzing	CO2
11.	Discuss solar power generation systems.	(16)	BTL3	Applying	CO2
12.	Compare solar thermal and solar PV technologies.	(16)	BTL4	Analyzing	CO2
13.	Analyze economic feasibility of solar energy.	(16)	BTL3	Applying	CO2
14.	Evaluate challenges in solar energy deployment.	(16)	BTL4	Analyzing	CO2
15.	Discuss advances in solar technologies.	(16)	BTL3	Applying	CO2
16.	Analyze solar energy storage systems.	(16)	BTL4	Analyzing	CO2
17.	Design a solar water heating system.	(16)	BTL3	Applying	CO2

UNIT-III WIND ENERGY

Wind data and energy estimation – Betz limit - Site selection for windfarms – characteristics –

Wind resource assessment.

Horizontal axis wind turbine – components - Vertical axis wind turbine – Wind turbine generators and its performance – Hybrid systems – Environmental issues - Applications.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Define wind energy.	BTL1	Remembering	CO3
2.	List the significance of wind data in energy estimation.	BTL2	Understanding	CO3
3.	What is meant by wind power density?	BTL1	Remembering	CO3
4.	Why is site selection important for wind farm installation?	BTL2	Understanding	CO3
5.	State the Betz limit.	BTL1	Remembering	CO3
6.	Differentiate between cut-in speed and cut-out speed	BTL2	Understanding	CO3
7.	List any two factors affecting wind speed.	BTL1	Remembering	CO3
8.	What is the purpose of wind resource assessment?	BTL2	Understanding	CO3
9.	What is a wind farm?	BTL1	Remembering	CO3
10.	Why can a wind turbine not extract all the kinetic energy from wind?	BTL2	Understanding	CO3
11.	Define cut-in wind speed.	BTL1	Remembering	CO3
12.	State the influence of hub height on wind energy generation.	BTL2	Understanding	CO3
13.	Define a Horizontal Axis Wind Turbine (HAWT).	BTL1	Remembering	CO3
14.	Differentiate between HAWT and VAWT.	BTL2	Understanding	CO3
15.	Define a Vertical Axis Wind Turbine (VAWT).	BTL1	Remembering	CO3
16.	What is the function of the nacelle in a wind turbine?	BTL2	Understanding	CO3
17.	List any four major components of a wind turbine.	BTL1	Remembering	CO3
18.	Why are wind turbine generators essential in wind energy conversion systems?	BTL2	Understanding	CO3
19.	What is a wind turbine generator?	BTL1	Remembering	CO3
20.	State the concept of a wind-solar hybrid system.	BTL2	Understanding	CO3
21.	What is meant by the rotor of a wind turbine?	BTL1	Remembering	CO3
22.	Discuss any two environmental issues associated with wind energy systems.	BTL2	Understanding	CO3
23.	State any two applications of wind energy.	BTL1	Remembering	CO3
24.	How wind turbine performance is affected by wind speed?	BTL2	Understanding	CO3

PART-B

1.	Calculate the power available in wind for a turbine of rotor diameter 40 m operating at a wind speed of 10 m/s. Assume air density as 1.225 kg/m ³ .	(16)	BTL3	Applying	CO3
----	---	------	------	----------	-----

2.	Analyze the factors affecting wind energy generation and discuss their impact on turbine performance.	(16)	BTL4	Analyzing	CO3
3.	A wind turbine operates at an average wind speed of 8 m/s with rotor swept area of 500 m ² . Determine the wind power available and estimate the maximum extractable power using the Betz limit.	(16)	BTL3	Applying	CO3
4.	Examine the Betz limit theory and analyze its significance in the design and performance evaluation of wind turbines.	(16)	BTL4	Analyzing	CO3
5.	Apply the procedure for selecting a suitable site for establishing a wind farm, considering technical and environmental factors.	(16)	BTL3	Applying	CO3
6.	Compare different wind farm site selection criteria and evaluate their suitability for maximizing energy production.	(16)	BTL4	Analyzing	CO3
7.	Using given wind speed data for a location, estimate the annual energy production of a wind turbine and discuss the influencing parameters.	(16)	BTL3	Applying	CO3
8.	Analyze the characteristics of wind resources at a potential site and evaluate its feasibility for large-scale wind farm development.	(16)	BTL4	Analyzing	CO3
9.	Demonstrate the methodology used for wind resource assessment and explain how the collected data are utilized in wind farm planning.	(16)	BTL3	Applying	CO3
10.	Illustrate the construction and working principle of a Horizontal Axis Wind Turbine and explain the function of its major components.	(16)	BTL3	Applying	CO3
11.	Demonstrate the operation of a Vertical Axis Wind Turbine with suitable diagrams and discuss its practical applications.	(16)	BTL3	Applying	CO3
12.	Analyze the factors affecting wind turbine performance and suggest methods to improve energy output.	(16)	BTL4	Analyzing	CO3
13.	Apply performance parameters such as power coefficient, tip speed ratio, and capacity factor to evaluate the performance of a wind turbine.	(16)	BTL3	Applying	CO3
14.	Analyze the factors affecting wind turbine performance and suggest methods to improve energy output	(16)	BTL4	Analyzing	CO3

15.	Design a basic wind–solar hybrid energy system for a remote village and explain its operational features.	(16)	BTL3	Applying	CO3
16.	Analyze various applications of wind energy in power generation, water pumping, and standalone systems, and assess their effectiveness.	(16)	BTL4	Analyzing	CO3
17.	Explain the selection and operation of different wind turbine generators used in modern wind energy conversion systems.	(16)	BTL3	Applying	CO3

UNIT-IV BIO-ENERGY

Bio resources – Biomass direct combustion – thermochemical conversion – biochemical conversion-mechanical conversion - Biomass gasifier - Types of biomass gasifiers – Cogeneration – Carbonization – Pyrolysis - Biogas plants – Digesters – Biodiesel production – Ethanol production - Applications

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Define biomass.	BTL1	Remembering	CO4
2.	List bio-resources.	BTL1	Remembering	CO4
3.	What is direct combustion?	BTL1	Remembering	CO4
4.	Define thermochemical conversion.	BTL1	Remembering	CO4
5.	Define biochemical conversion.	BTL1	Remembering	CO4
6.	What is mechanical conversion?	BTL1	Remembering	CO4
7.	Define gasification.	BTL1	Remembering	CO4
8.	What is a biomass gasifier?	BTL1	Remembering	CO4
9.	List types of biomass gasifiers.	BTL1	Remembering	CO4
10.	Define cogeneration.	BTL1	Remembering	CO4
11.	What is carbonization?	BTL1	Remembering	CO4
12.	Define pyrolysis.	BTL1	Remembering	CO4
13.	What is biogas?	BTL1	Remembering	CO4
14.	What is a digester?	BTL2	Understanding	CO4
15.	List feedstock for biogas production.	BTL1	Remembering	CO4
16.	Define biodiesel.	BTL2	Understanding	CO4
17.	Define ethanol production.	BTL2	Understanding	CO4
18.	State advantages of biomass energy.	BTL2	Understanding	CO4
19.	What is anaerobic digestion?	BTL2	Understanding	CO4
20.	What is producer gas?	BTL2	Understanding	CO4
21.	Mention applications of biogas.	BTL2	Understanding	CO4
22.	State applications of biodiesel.	BTL2	Understanding	CO4
23.	Define biofuel.	BTL2	Understanding	CO4
24.	List advantages of cogeneration.	BTL2	Understanding	CO4

PART-B

1.	Explain the utilization of biomass resources for energy production and power generation.	(16)	BTL3	Applying	CO4
2.	Compare various biomass conversion technologies based on their efficiency and applications.	(16)	BTL4	Analyzing	CO4
3.	Explain the process of direct combustion of biomass and discuss its role in renewable energy generation	(16)	BTL3	Applying	CO4
4.	Analyze the thermochemical and biochemical conversion processes used for biomass utilization	(16)	BTL4	Analyzing	CO4
5.	Explain how energy is produced through thermochemical conversion methods such as gasification and pyrolysis.	(16)	BTL3	Applying	CO4
6.	Compare gasification, pyrolysis, and carbonization processes based on their output products and applications	(16)	BTL4	Analyzing	CO4
7.	Explain the working principle of biomass gasifiers and discuss their applications in decentralized power generation	(16)	BTL3	Applying	CO4
8.	Analyze the different types of biomass gasifiers and evaluate their performance characteristics.	(16)	BTL4	Analyzing	CO4
9.	Explain the utilization of cogeneration systems for improving energy efficiency in industries	(16)	BTL3	Applying	CO4
10.	Analyze the advantages and limitations of cogeneration systems used in biomass-based power plants.	(16)	BTL4	Analyzing	CO4
11.	Explain the production of biogas using digesters and discuss its applications in rural energy systems.	(16)	BTL3	Applying	CO4
12.	Analyze different biogas plant designs and justify their suitability for various applications.	(16)	BTL4	Analyzing	CO4
13.	Explain the production of biodiesel from biomass feedstocks and discuss its use as an alternative fuel.	(16)	BTL3	Applying	CO4
14.	Analyze the biodiesel production process and discuss its environmental benefits	(16)	BTL4	Analyzing	CO4
15.	Explain the production of ethanol from biomass and discuss its applications as a transportation fuel	(16)	BTL3	Applying	CO4
16.	Analyze the economic and environmental aspects	(16)	BTL4	Analyzing	CO4

	of ethanol production from biomass				
17.	Analyze the role of bio-energy technologies in reducing dependence on fossil fuels	(16)	BTL4	Analyzing	CO4

UNIT-V OCEAN AND GEOTHERMAL ENERGY

Small hydro - Tidal energy – Wave energy – Open and closed OTEC Cycles –Limitations – Geothermal energy – Geothermal energy sources - Types of geothermal power plants – Applications - Environmental impact

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Define Small Hydro Power (SHP).	BTL1	Remembering	CO5
2.	What are the classifications of small hydro power plants?	BTL1	Remembering	CO5
3.	Define tidal energy.	BTL1	Remembering	CO5
4.	List any two advantages of tidal energy.	BTL1	Remembering	CO5
5.	What is a tidal barrage?	BTL1	Remembering	CO5
6.	Define wave energy.	BTL1	Remembering	CO5
7.	Mention any two sources of ocean wave energy.	BTL1	Remembering	CO5
8.	State the principle of wave energy conversion.	BTL2	Understanding	CO5
9.	What is Ocean Thermal Energy Conversion (OTEC)?	BTL1	Remembering	CO5
10.	State the working principle of OTEC.	BTL2	Understanding	CO5
11.	What is an open-cycle OTEC system?	BTL1	Remembering	CO5
12.	What is a closed-cycle OTEC system?	BTL1	Remembering	CO5
13.	List any two advantages of OTEC plants.	BTL2	Understanding	CO5
14.	Mention any two limitations of OTEC plants.	BTL2	Understanding	CO5
15.	Define geothermal energy.	BTL1	Remembering	CO5
16.	What are geothermal reservoirs?	BTL1	Remembering	CO5
17.	List the different geothermal energy sources.	BTL1	Remembering	CO5
18.	What is a dry steam geothermal power plant?	BTL1	Remembering	CO5
19.	What is a flash steam geothermal power plant?	BTL1	Remembering	CO5
20.	What is a binary cycle geothermal power plant?	BTL1	Remembering	CO5
21.	Mention any two applications of geothermal energy.	BTL2	Understanding	CO5
22.	State any two advantages of geothermal energy.	BTL2	Understanding	CO5
23.	Differentiate between tidal energy and wave energy.	BTL2	Understanding	CO5
24.	Compare open-cycle and closed-cycle OTEC systems.	BTL2	Understanding	CO5

PART-B

1.	Explain the operation of a Small Hydro Power Plant and discuss its suitability for rural electrification projects	(16)	BTL3	Applying	CO5
2.	Analyze the feasibility of installing a Small Hydro Power Plant in a hilly region with abundant water resources	(16)	BTL4	Analyzing	CO5

3.	Explain the working of a tidal power plant based on the principles of tidal energy conversion.	(16)	BTL3	Applying	CO5
4.	Analyze the advantages and limitations of tidal energy as a reliable source of renewable energy.	(16)	BTL4	Analyzing	CO5
5.	Explain how wave energy is converted into electrical energy using suitable wave energy conversion systems.	(16)	BTL3	Applying	CO5
6.	Analyze the performance and challenges of different wave energy conversion technologies.	(16)	BTL4	Analyzing	CO5
7.	Explain the generation of electrical power from ocean thermal gradients using an Open-Cycle OTEC system.	(16)	BTL3	Applying	CO5
8.	Compare and analyze the operational characteristics of Open-Cycle and Closed-Cycle OTEC systems.	(16)	BTL4	Analyzing	CO5
9.	Explain the operation of a Closed-Cycle OTEC system using ocean temperature differences.	(16)	BTL3	Applying	CO5
10.	Analyze the technical and economic limitations associated with OTEC power generation.	(16)	BTL4	Analyzing	CO5
11.	Explain the utilization of geothermal reservoirs for electricity generation.	(16)	BTL3	Applying	CO5
12.	Analyze different geothermal energy sources and evaluate their suitability for power production.	(16)	BTL4	Analyzing	CO5
13.	Explain the operating principles of Dry Steam, Flash Steam, and Binary Cycle Geothermal Power Plants.	(16)	BTL3	Applying	CO5
14.	Explain the utilization of geothermal energy for industrial, agricultural, and domestic applications with suitable examples.	(16)	BTL3	Applying	CO5
15.	Analyze the environmental impacts of geothermal power plants and suggest suitable mitigation measures	(16)	BTL4	Analyzing	CO5
16.	Analyze the environmental impacts associated with tidal, wave, and OTEC power generation systems.	(16)	BTL4	Analyzing	CO5
17.	Explain the role of ocean and geothermal energy technologies in sustainable energy development.	(16)	BTL3	Applying	CO5

Course Outcome:

Discuss the Indian and global energy scenario.

Describe the various solar energy technologies and its applications.

Explain the various wind energy technologies

Explore the various bio-energy technologies
Discuss the ocean and geothermal technologies.