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7E1832

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B. Tech. VII - Sem. (Main / Back) Exam., Nov-Dec 2025
Electrical Engineering
7EE5-11 Wind and Solar Energy Systems

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 How the wind energy conversion systems are classified?

Q.2 Enumerate some of the applications of solar PV systems.

Q.3 Differentiate between stall control and pitch control in wind turbines.

Q.4 What are the major power quality issues in renewable integration?

Q.5 What are the main differences between fixed and variable speed wind turbines?

Q.6 Explain the working principle of an induction generator in wind turbines.

Q.7 What are the key characteristics of DFIG in wind power systems?

Q.8 What are the differences between a PV module and PV array?

Q.9 Why are power electronic converters necessary in solar systems?

Q.10 How do solar PV systems behave during grid disturbances?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 What is a solar pond and how is it used?

Q.2 What are global experiences of renewable power system interconnection? Explain in detail.

Q.3 Derive the Betz limit, emphasizing its significance in defining the maximum theoretical efficiency of a wind turbine.

Q.4 Explain the V-I characteristics of a PV cell and extend this to modules and arrays.

Q.5 Discuss the technical requirements of grid codes for renewable energy integration.

Q.6 Explain the operating principles of Induction Generators and Doubly-Fed Induction Generators, including their characteristics and suitability for large-scale wind farms.

Q.7 Explain the concept of the solar radiation spectrum and its relevance in solar energy conversion.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Describe different MPPT techniques and explain how converter control strategies help maximize efficiency in solar PV systems.

Q.2 Explain the concept of fault ride-through in wind farms and its importance in maintaining grid stability.

Q.3 Explain the elementary analysis of energy conversion in solar systems, highlighting the advantages and limitations of solar pond technology.

Q.4 Compare Indian wind energy statistics with global figures and explain the challenges and opportunities faced by the sector.

Q.5 Discuss how tip speed ratio affects efficiency and explain stall and pitch control methods used to optimize power extraction.

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B. Tech. VII - Sem. (Main / Back) Exam., Nov-Dec 2025
Open Elective - I
7EE6-60.2 Power Generation Sources

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 List main parts of a wind turbine.

Q.2 Write methods of OTEC generation.

Q.3 Differentiate wave versus tidal energy.

Q.4 What's the approximate total power generation, generation from each energy sources in India?

Q.5 Distinguish between renewable and non-renewable energy sources.

Q.6 Name compounds present in coal or products from crude oil.

Q.7 What is beam radiation and global radiation?

Q.8 List types of solar collectors.

Q.9 What are causes of wind formation? Differentiate between wind turbine and wind generator.

Q.10 What is biomass? Define anaerobic digestion or fermentation.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Outline India's energy needs and briefly summarize global energy consumption trends.

Q.2 Explain wind power equation or classify types of VAWT/HAWT.

Q.3 State principle and applications of a solar pond.

Q.4 Explain biomass gasification and compare biodiesel and bioethanol.

Q.5 Describe fixed dome and floating drum biogas digesters.

Q.6 Briefly explain hydrogen production methods or applications of hydrogen.

Q.7 Outline geothermal power plant classification, explain the working principle and application.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Discuss energy security, environmental aspects and how energy planning influences sustainable development.

Q.2 Elaborate solar thermal systems, solar PV with diagrams.

Q.3 Describe wind energy conversion system with suitable diagram. Discuss site characteristics for wind energy generation system.

Q.4 Discuss biomass conversion technologies in detail.

Q.5 Explain working of flat plate collector and concentrating collector.

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B. Tech. VII - Sem. (Main / Back) Exam., Nov-Dec 2025

Open Elective - I

7AG6-60.2 Environmental Engineering and Disaster Management

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 State the per capita domestic water requirement for urban and rural areas in India.

Q.2 List two main sources of surface water supply.

Q.3 What is the function of intake structure?

Q.4 State the desirable values/range of pH, TDS, NO_3 and turbidity as per BIS standards for drinking water.

Q.5 Define BOD of wastewater.

Q.6 Name any two types of sewers.

Q.7 Give one example of primary treatment of wastewater.

Q.8 Define air pollution.

Q.9 List two gaseous air pollutants.

Q.10 What is the full form of NDMA? What is its main function?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Compare domestic water requirements of urban and rural areas in India with suitable examples.

Q.2 Describe the role and working mechanism of sedimentation tanks in water treatment.

Q.3 Write a note on BIS drinking water quality standards (IS 10500 : 2012).

Q.4 Explain the significance of hydraulic design of sewers.

Q.5 Discuss the major physical, chemical and biological characteristics of wastewater.

Q.6 Describe composting as a method of solid waste management.

Q.7 Explain the concept of disaster preparedness and its importance.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Explain different sources of water supply and factors influencing the choice of a source for urban water supply schemes.

Q.2 Explain the various stages in conventional water treatment including their functions and significance.

Q.3 Describe in detail the methods of solid waste disposal and their suitability under Indian conditions.

Q.4 Discuss various types of air pollutants, their sources and health/environmental impacts.

Q.5 Explain the importance of disaster management in India and discuss different phases (prevention, preparedness, response, recovery).
