

7E1832

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Total No. of Pages: 3**7E1832**

**B. Tech. VII - Sem. (Main / Back) Exam., - 2024**  
**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 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. NIL2. NIL**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 What is the value of Betz's coefficient? What does it signifies?
- Q.2 Define Tip Speed Ratio (TSR).
- Q.3 Name the power on which variable speed wind turbines have control.
- Q.4 What is the full form of WECS?
- Q.5 In solar geometry, which angle is known as Surface Azimuth Angle ( $\gamma$ )?

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- Q.6 What does Local Apparent Time (LAT) signifies?
- Q.7 What is the full form of MPPT?
- Q.8 Define Fill Factor (FF).
- Q.9 Give two reasons why induction generators are used in Wind Turbines?
- Q.10 Give two applications of solar thermal power generators.

### **PART – B**

**[5×4=20]**

#### **(Analytical/Problem solving questions)**

#### **Attempt any five questions**

- Q.1 Write a short note on historical background & development of wind power in India. Also identify the gaps in using wind power as main energy source.
- Q.2 “Solar geometry plays a vital role in various practical applications”, support this statement with the significant applications of solar geometry in day to day life.
- Q.3 Briefly explain the terms Solar Declination ( $\delta$ ) and Solar Elevation angle (Altitude).
- Q.4 Briefly explain solar PV and wind farm behavior during grid disturbances.
- Q.5 Write a short note on Doubly-Fed Induction Generators (DFIG) and briefly explain their characteristics.
- Q.6 Analyze V-I characteristics of a PV cell.
- Q.7 How does a Solar Pond work? Also discuss its applications.



**PART – C****[3×10=30]****(Descriptive/Analytical/Problem Solving/Design Questions)****Attempt any three questions**

- Q.1 In wind generation topology, explain the operation and control of a Doubly-Fed Induction Generator (DFIG) system. Also discuss their applications.
- Q.2 What are the recent technologies used in the installation of wind farms in India? Narrate the challenges in installation of wind farms in India. Suggest in your own words how these challenges can be answered. Also enlist the applications and advantages of wind energy generation.
- Q.3 Explain the Parametric Models and Decomposition Models that can determine diffuse solar radiation on horizontal surfaces. Also discuss about the advantages and limitations each such model.
- Q.4 Explain hybrid and isolated operations of solar PV and wind systems.
- Q.5 Explain any two of the followings technologies in solar thermal power generation -
- (A) Parabolic Dish      (B) Central Receivers      (C) Fresnel
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B. Tech. VII - Sem. (Main / Back) Exam., - 2024

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 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. NIL2. NIL**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

Q.1 Explain the function of following -

- (a) Spillways
- (b) Surge tank
- (c) Penstocks
- (d) Dam

Q.2 What is difference between Nuclear Fission and Nuclear Fusion?

Q.3 What do you understand by Base Load and Peak Load on power station?

Q.4 What are limitations of solar energy? What are the indirect forms of solar energy?



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- Q.5 What are the important measures for selecting the different power plants and their locations?
- Q.6 Differentiate Tide and Wave.
- Q.7 What are the constituents of biogas?
- Q.8 What are the main hurdles in the way of common use of fuel cell?
- Q.9 What is the origin of biomass energy?
- Q.10 What is Renewable Energy? What are the advantages and disadvantages of conventional & non-conventional energy sources?

### **PART – B**

[5×4=20]

#### **(Analytical/Problem solving questions)**

#### **Attempt any five questions**

- Q.1 Give the comparison among steam power plant, hydro-electric power plant, diesel power plant and nuclear power plant.
- Q.2 Explain the working of solar thermal water pump and draw schematic diagram.
- Q.3 Discuss main components of VAWT with suitable diagram. Compare HAWT and VAWT.
- Q.4 Discuss why?
- (a) Nuclear power plants are used only as base load plants
  - (b) Control rods are used in nuclear power reactor
- Q.5 What are the main types of OTEC power plants? Describe their working in brief.
- Q.6 Explain with neat sketch, the methods of operation of tidal power generation.
- Q.7 Describe the classification of the fuel cells. Draw a conceptual block diagram of a fuel cell power plant and explain the detail of each block.

**PART – C****[3×10=30]****(Descriptive/Analytical/Problem Solving/Design Questions)****Attempt any three questions**

- Q.1 Explain operation of Steam Power Plant with suitable schematic diagram.
- Q.2 What are the different types of pumped storage power generation? Explain its advantages & disadvantages.
- Q.3 What are the problems in the use of nuclear energy? Discuss basic plant schemes with boiling water reactor.
- Q.4 Write a short note on Indian and Worldwide Current Energy Scenario.
- Q.5 Explain the process of gasification of solid bio fuels. What are the factors affecting the performance of biogas digester?
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B. Tech. VII - Sem. (Re Back) Exam., - 2024

Electrical Engineering

7EE5-11 Wind and Solar Energy Systems

Time: 3 Hours

Maximum Marks: 120

Min. Passing Marks: 42

*Instructions to Candidates:*

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

*Schematic diagrams must be shown wherever necessary. Any data you feel missing 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. NIL2. NIL**PART – A**

[10×2=20]

**(Answer should be given up to 25 words only)****All questions are compulsory**

Q.1 Explain the wind power system.

Q.2 What is wind farm?

Q.3 Define tip speed ratio with expressions.

Q.4 Explain the classifications of wind mills.

Q.5 Explain the term “stall”.



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- Q.6 Explain Fixed and Variable Speed Wind Turbines.
- Q.7 What is Sun angle?
- Q.8 Explain Solar Radiation Spectra.
- Q.9 Explain uses of PV solar module.
- Q.10 Explain some application of solar thermal power generation.

**PART – B**

[5×8=40]

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1 Explain the history of Wind Power and Indian & Global Statistics.
- Q.2 Explain the Generator convertor configurations in a wind turbine.
- Q.3 Explain the Permanent Synchronous Generator and Power Electronics Converters.
- Q.4 Explain concept of 'Solar Pond' and its applications.
- Q.5 Explain estimation of solar energy availability.
- Q.6 Explain the Solar PV and Wind farm behavior during Grid disturbances.
- Q.7 Explain the Maximum power point Tracking algorithms in solar photovoltaic.



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## PART – C

[4×15=60]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any four questions

- Q.1 What are the main types of power electronics convertors for solar system?  
Describe their working in brief.
- Q.2 Describe Wind speed statistics probability distributions and “stall and pitch control” in detail.
- Q.3 What is the principle of solar photovoltaic power generation? Explain the V-I characteristics of PV cell.
- Q.4 With reference to solar resources, explain the following -
- (a) Observer sun angle
  - (b) Solar day length
  - (c) Solar geometry
- Q.5 Write a short note on the following – (any three)
- (a) Doubly fed Induction Generators and their characteristics
  - (b) Parabolic trough
  - (c) Fresnel
  - (d) Central Receivers
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**7E1736**

**B. Tech. VII - Sem. (Re Back) Exam., - 2024**

**Open Elective – I**

**7EE6-60.2 Power Generation Sources**

**Time: 3 Hours**

**Maximum Marks: 120**

**Min. Passing Marks: 42**

*Instructions to Candidates:*

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

*Schematic diagrams must be shown wherever necessary. Any data you feel missing 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 What are the environmental aspects of energy utilization?
- Q.2 Explain the Fissile and Fertile materials.
- Q.3 Discuss the combined gas & steam plants.
- Q.4 Describe the efficiencies of various power plants.
- Q.5 What is heavy water reactor?
- Q.6 Discuss Solar Pond.
- Q.7 Explain the Solar desalination.

- Q.8 What is Magnus effect?
- Q.9 Briefly explain the site characteristics for wind energy conversion systems.
- Q.10 What is Pyrolysis?

### **PART – B**

[5×8=40]

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1 Discuss the current energy scenario in India.
- Q.2 Describe Energy planning.
- Q.3 Explain the basic schemes and working principle thermal power plants.
- Q.4 Discuss the fast breeder reactor.
- Q.5 Explain the Solar heating and cooling techniques.
- Q.6 Briefly explain the Horizontal and Vertical Axis Wind Turbines.
- Q.7 What are the Open and Closed OTEC Cycles?

### **PART – C**

[4×15=60]

**(Descriptive/Analytical/Problem Solving/Design Questions)**

**Attempt any four questions**

- Q.1 Describe in detail the “Environment – Economy – Energy and Sustainable Development”.
- Q.2 Explain the open cycle and closed cycle gas turbine plants.
- Q.3 Define the Flat plate and Concentrating collectors.
- Q.4 Describe the Solar photo voltaic conversion.
- Q.5 Discuss the design and applications for biomass energy conversion.
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