

P.R. GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc Physics Paper – VIII(C 2) – Semester – VI

w.e.f. 2017 - 18 ADMITTED BATCH

Course Code : Cluster Elective VIII(C 2)

No. of credits : 03

Cluster Elective Paper VIII(C 2): Wind, Hydro and Ocean Energies

No. of Hours per week: 03

Total Lectures:45

UNIT-I(8hrs)

1. Introduction: Wind generation, meteorology of wind, world distribution of wind, wind speed variation with height, Wind speed Statistics, Wind energy conversion principles; General introduction; Types and classification of WECS.

UNIT-II(9hrs)

2. Wind Energy Conversion System: Aerodynamic design principles; Aerodynamic theories; Axial momentum, blade element; Rotor characteristics; Maximum power coefficient.

UNIT-III(9hrs)

3. Wind Energy Application: Wind pumps: Performance analysis, design concept and testing; Principle of wind energy generation; Wind energy in India; Environmental Impacts of Wind farms.

UNIT-IV(9hrs)

4. Small Hydropower Systems: Overview of micro, mini and small hydro systems; Hydrology; Site selection; Speed and voltage regulation.

UNIT-V(5hrs)

5. Ocean Thermal Energy Systems: Ocean Thermal - Introduction, working principle, Electricity generation methods from OCET, Advantages and disadvantages, Applications of OTEC.

UNIT-VI(5hrs)

6. Tidal Energy - Introduction, Origin and nature of tidal energy, Wave Energy – Introduction, Wave energy conversion devices, Advantages and disadvantages, Applications of wave energy.

Reference Books:

1. Dan Charis, Mick Sagrillo, LanWoofenden, “Power from the Wind”, New Society Pub., 2009.
2. Erich Hau, “Wind Turbines-Fundamentals, Technologies, Applications, Economics”, 2nd Edition, Springer Verlag, BerlinHeidelberg, NY, 2006.
3. Joshue Earnest, Tore Wizelius, Wind Power and Project Developmen”, PHI Pub., 2011.

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4. T. Burton, D. Sharpe, N. Jenkins, E. Bossanyi, Wind Energy Handbook, John Wiley Pub., 2001.
5. Paul Gipe, “Wind Energy Basics”, Chelsea Green Publications, 1999.
6. Khan, B.H., “Non-Conventional Energy Resources”, TMH, 2nd Edition, New Delhi, 2009.
7. Tiwari, G.N., and Ghosal, M.K, Renewable Energy Resources – Basic Principles and applications, Narosa Publishing House, 2007.

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Cluster Elective Paper VIII(C 2): Wind, Hydro and Ocean Energies

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No. of credits : 03

Note:- Set the question paper as per the blue print given at the end of this model paper.
Time: 2 1/2 Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6 x 5 M = 30M
Total	14	10	30M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
I	1	2	20
II	1	2	20
III	1	1	15
IV	1	1	15
V	--	2	10
VI	1	1	15
Total			95

SUBJECT: PHYSICS

QUESTION BANK

PAPER: VIII C2

SEMESTER: VI

Wind, Hydro and Ocean Energies

UNIT – I (Introduction)

Essay Questions – 10 M

1. Explain the nature of variation of wind speed with height from the ground.
2. Explain types and classification of WECS.

Short Questions – 5 M

3. Write a short note on wind generations.
4. Classify categories of winds.
5. Explain distribution of wind around the world.
6. Describe the principles of Wind energy conversions.

UNIT – II (Wind Energy Conversion System)

Essay Questions – 10 M

7. Explain Rotor characteristics of a wind turbine.
8. Explain blade element theory to analyse the aerodynamics of the wind turbines.

Short Questions – 5 M

9. Explain maximum power coefficient in wind turbines.
10. Describe Aerodynamic design principle.
11. Explain axial momentum theory to analyse the aerodynamics of the wind turbines in brief.

UNIT – III (Wind Energy Application)

Essay Questions – 10 M

12. Explain Performance analysis and design concept of wind pumps.
13. Explain Environmental impacts of wind farms

Short Questions – 5 M

14. Discuss wind energy in India.
15. Write the principle of wind generation.
16. Describe how wind pumps are testing.

UNIT – IV (Small Hydropower Systems)

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Essay Questions – 10 M

17. Explain overview of micro, mini and small hydro systems

Short Questions – 5 M

18. Write about site selection of pumps and turbines.

19. Explain briefly about speed and voltage regulation of hydro power systems.

UNIT – V (Ocean Thermal Energy Systems)

Short Questions – 5 M

20. Write any six applications of OTEC.

21. Explain open cycle method of electricity generation from OTEC.

22. Explain closed cycle method of electricity generation from OTEC.

23. Write the advantages & disadvantages of ocean thermal energy.

24. Explain the working principle of ocean thermal energy conversion.

UNIT – VI (Tidal and Wave Energy Systems)

Essay Questions – 10 M

25. Explain wave energy conversion devices.

26. Discuss the origin and nature of tidal energy

Short Questions – 5 M

27. Discuss the applications of wave energy.

28. What are the advantages and disadvantages of wave energy.