Roll No……..….. **Total No. of Printed Pages: [1]**
Total No. of Questions: [11]

M. Sc. Chemistry (Semester – 3rd)
SCIENCE OF RENEWABLE ENERGY SOURCES
Subject Code: MPHY0F92
Paper ID: [OE2220213]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It carries 16 marks. It consists of 4 questions of 4 marks each.
2. Section B consist of 4 questions of 8 marks each. The student has to attempt any 3 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(4 marks each)**

Q1. What is the status of production and reserves of energy sources in India?
Q2. Differentiate the solar radiation, outside the earth's atmosphere w.r.t. the surface of earth.
Q3. What is solar hydrogen energy? Explain in brief.
Q4. Explain the nature of wind. What is the need for the study of wind energy?

Section – B **(8 marks each)**

Q5. Explain the need for the alternatives of energy sources. Also explain the renewable energy sources and their importance in the world.
Q6. Explain the working of a solar cell? What are its various types? Describe the principle of single crystal and polycrystalline silicon solar cells.
Q7. Explain in detail the storage processes of hydrogen. Discuss in detail the solid state hydrogen storage materials.
Q8. (a). Discuss in detail the working of wind machines. Also give the classification and descriptions of wind machines with help of suitable examples.
(b). How we can justify the energy in the wind? Explain Power coefficient in brief.

Section – C **(10 marks each)**

Q9. (a). Differentiate between the direct and indirect transition semi-conductors with the help of suitable examples?
(b). Discuss the elementary idea of Tandem Solar cells in detail.
(c). Elaborate the interrelationship between absorption coefficients and band gap, recombination of carriers. Also explain the significance of this interrelationship.
Q10. Write short notes on the followings:
(a). Safety factors for hydrogen storage,
(b). Hydride Batteries,
(c). Use of Fuel Cells in vehicles.
Q11. (a). What is OTEC? Discuss the significance of OTEC in detail with the help of an example.
(b). Explain in detail the system designs for OTEC. Discuss any three different types in detail.