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M. Tech. EXAMINATION, May 2018

(Second Semester)

(B. Scheme) (Main & Re-appear)

(MSN)

MSN630

MATERIALS FOR ENERGY AND ENVIRONMENT

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. All questions carry equal marks. Assume a reasonable value for a parameter if not provided in the paper.

7. Describe the synthesis of nanomaterials for (any *two*) : **20**

(a) Energy generation

(b) Energy conversion

(c) Environment monitoring.

8. What are the different electrochemical routes being investigated for sustainable energy generation and protection of environment ? How important are catalytic agents in these routes ? Differentiate between heterogeneous and homogeneous. **20**

1. (a) What is the importance of energy generation methods in the current scenario of global climate change patterns ? Describe in detail.

(b) How do you define the term "environment" ? What is the scale on which we need to consider modifications for protecting our environment ? What are the alternatives available to create a technological society which needs energy while maintaining the sustainability of our resources and quality of living standards. **10+10=20**

2. How do different biofuels compare in their life-cycle costs and CO_2 emissions ? Which biofuels are likely to impact food security ? **20**

3. Describe the different methods of energy generation and storage. Elaborate upon two of the renewable sources of energy that can potentially provide both high power and cleaner environment. What are the obstacles in each choice at the present ? **20**

4. How is the science of catalysis and catalytic synthesis/processing of materials importance for the economy and energy futures ? Describe a catalytic process capable of generation of hydrogen gas, which is one of the potentially useful fuels that protects the environment. **20**

5. Describe using properly labelled sketches, the structure of any *two* : **10+10=20**

(a) Ion exchanger

(b) Ionic conductors

(c) Permeable membranes.

6. Describe the synthesis techniques involved using : **20**

(a) Catalytic adsorbents

(b) Semi-permeable membranes

Use examples to illustrate your answer.