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M.Sc. DEGREE EXAMINATION, APRIL 2018.  
MATERIAL SCIENCE AND NANO TECHNOLOGY  
FOURTH SEMESTER  
Paper IV — ENERGY CONVERSION TECHNOLOGIES

Time : Three hours

Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. What are the basic methods involved in production of diesel from plants and algae?
2. Briefly explain what is meant by bio refinery.
3. Write the Advantages and disadvantages of Lithium batteries.
4. Distinguish between acid and solid state batteries.
5. What are the types of fuel cells?
6. Write a short note on small organic material of solar cells.
7. Write the applications of dye sensitized solar cells.
8. Explain the basic concept of dispersed and molecular heterojunctions.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. Write in detail about Fischer - Tropsch diesel gasification chemical process.

Or

10. Discuss briefly about biogas production and thermochemical process.

11. State principle of battery operation. Explain construction and working of lithium batteries. Write its applications.

Or

12. Discuss about the construction of primary, secondary batteries and write its applications.
13. What is the principle of fuel cell? Discuss about operation and working of phosphoric acid and direct methanol fuel cells.

Or

14. What is the principle of Proton exchange membrane (PEM) fuel cell? Describe construction and working of (PEM) fuel cell and write its applications.
15. What is the importance of solar cells and discuss briefly about organic, inorganic and silicon solar cells?

Or

16. Discuss briefly about the manufacturing of inorganic solar cells and compare the properties of them.

