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Code No. : 15109 O(B)

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. III Year I-Semester Supplementary (Old) Examinations, May/June-2019**

**Electrochemical Energy Systems**  
(Open Elective-V)

Time: 3 hours

Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

1. Compute the power density in W/Kg of a battery having 1000grams which produces 25 amp of current under the potential difference of 50 V.
2. What is flat discharge rate and write its importance in the selection of a good battery.
3. What are the advantages of lithium batteries over other batteries?
4. List out the methods used to activate reserve batteries.
5. Mention the advantages of Ni metal hydride batteries over Ni-Cd batteries.
6. Define memory effect and why a good battery should not have any memory effect?
7. Classify the flow cells based on nature of electrolyte.
8. Write the working principle and advantages of fuel cells over other cells.
9. Define Cycle life and write its significance for a good battery.
10. Name the anode, cathode and electrolyte used in alkaline fuel cell and mention one example for alkaline fuel cell.

**Part-B (5 × 10 = 50 Marks)**

11. a) List the characteristics of a battery and explain each term. [6]  
b) How the shelf life of a battery depends on nature of electrolyte and what electrolyte is preferable for better shelf life. [4]
12. a) Generally KOH is preferred over NaOH as electrolyte for an alkaline battery -Justify. [4]  
b) Illustrate the construction and electrochemistry of Li-MnO<sub>2</sub> cell. [6]
13. a) Describe the construction and charging and discharging reactions involved in lithium ion cell with neat diagram. [6]  
b) List the advantages to use VRLA batteries in the place conventional lead acid batteries and write its discharging and charging reactions. [4]
14. a) Discuss the construction, reactions involved in solid oxide fuel cell with neat diagram and mention the applications. [7]  
b) Classify the flow cells based on working temperature. [3]
15. a) Explain the chemistry of silver peroxide-zinc alkaline reserve battery and write its limitations. [6]  
b) Differentiate between primary, secondary and reserve batteries. [4]
16. a) Illustrate the construction and reactions of molten carbonate fuel cell. [5]  
b) Metallic lithium is used as anode for the construction of non rechargeable cells but lithium stored materials is used for rechargeable cells- Explain. [5]
17. Answer any *two* of the following:  
a) Describe the construction, discharging and charging reactions of Ni-Cd battery. [5]  
b) Fuel cells are the future source of energy-justify. [5]  
c) Write a note on importance of electrochemical energy systems in different fields. [5]