

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI- 86
(For candidates admitted during the academic year 2016–17 & thereafter)

SUBJECT CODE : 16VS/VA/MF45

B. Voc. DEGREE EXAMINATION, APRIL 2018
SUSTAINABLE ENERGY MANAGEMENT
FOURTH SEMESTER

COURSE : ALLIED CORE

PAPER : MICROBIAL FUEL CELLS

TIME : 3 HOURS

MAX. MARKS : 100

SECTION – A
ANSWER ALL QUESTIONS

(30x1 = 30)

I. Choose the correct Answer:

1. The typical voltage produced by a PEMF fuel cell is
a) 7 mV b) 70 mV c) 700 mV d) 500 mV
2. Microbial fuel cells are considered as a source of sustainable energy. Because
a) They use microbes as catalyst
b) They can use a variety of inorganic material as substrate
c) They can be installed for waste water treatment
d) All the above
3. Fuel cell can be connected in series to
a) increase voltage b) decrease voltage c) increase current d) decrease current
4. Select the incorrect statement from the following option.
a) Fuel cells have high efficiency
b) The emission levels of fuel cells are far below the permissible limits
c) Fuel cells are modular
d) The noise levels of fuel cells are high
5. Which of the following is not an example of fuel cell?
a) Hydrogen-oxygen cell b) Methyl-oxygen-alcohol cell
c) Propane-oxygen cell d) Hexanone-oxygen cell
6. I-V curve means
a) Impedance vs Voltage b) Current vs Voltage
c) Current vs Capacitance d) Impedance vs Capacitance
7. EIS stands for
a) Electron Impedance spectroscopy b) Electrical Impedance spectroscopy
c) Electrochemical Impedance spectroscopy d) Electrostatic Impedance spectroscopy
8. The residual product discharged by the hydrogen-oxygen cell is
a) Hydrogen peroxide b) Alcohol
c) Water d) Potassium permanganate
9. The electrolytic solution used in hydrogen-oxygen fuel cell is
a) 75% KOH solution b) 25% KOH solution
c) 75% NaOH solution d) 25% NaOH solution

II. Fill in the Blanks:

10. The idea of using microbes to produce electricity was conceived by ----- .

11. A fuel cell is used to convert ----- in to electrical energy.
12. A fuel cell uses ----- to produce electricity.
13. Fuel cell can be connected in ----- to increase current.
14. Oxidation is ----- of electrons.
15. The lightest element of the periodic table is -----.
16. Microbial fuel cell operate well at pH of -----
17. CFD model stands for-----.
18. BOD stands for -----.
19. Anaerobic means -----.

III. Answer in a sentence or two:

20. Name two microbes that can be used in a microbial fuel cell.
21. Write down the requirement to promote high rate of electrode processes.
22. State true or false. Fuel cells are free from vibrations, heat transfer and thermal pollution.
 - a) True b) False
23. Write down the overall fuel cell reactions.
24. State true or false. The product is pure enough that it can even be used for drinking purpose.
 - a) True b) False
25. What is the role of an electrolyte in a fuel cell?
26. List two different types of fuel cell.
27. Write two applications of microbial fuel cells.
28. What are the main disadvantages of Pt electrode?
29. Give your idea to increase the surface area of material.
30. How do MFC work as biosensors?

SECTION – B

Answer any SIX questions:

(6x5=30)

31. What is the need of fuel cell? Write a brief note on the history of fuel cell?
32. Explain how fuel cells are classified based on temperature?
33. Write a short note on the following. a) Catalyst b) activation kinetics
34. Describe the needs for characterization of fuel cell?
35. Explain the construction and working of a microbial fuel cell with a neat diagram.
36. Compare the operating temperature, efficiency and the fuel choices of different fuel cells.
37. Account an applications microbial fuel cells in wastewater treatment
38. How MFC can be used as biosensor? Explain in detail.

SECTION – C

Answer any TWO questions:

(2x20=40)

39. Differentiate between Microbial Fuel Cells and Traditional Fuel Cells.
40. Explain in detail about the various characterization techniques for the testing of a fuel cell.
41. Explain in detail about the In-Situ and Ex-Situ techniques available for the characterization of a fuel cell.
42. Explain in detail about the working of fuel cells that are classified based on their electrolyte type.
