[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
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16308(D) - 0 DEC 2016

B. Tech 8th Semester Examination

Alternative Fuels (NS)

AU-421(c)

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : This question paper carries five sections. Attempt any five questions selecting at least one question each from section A, B, C & D. Section E is compulsory.

SECTION - A

1. (a) Specify the energy status of India and what is the role of non-conventional energy in Himachal Pradesh? (10)

   (b) Explain the principle of conversion of solar radiation into heat. (5)

   (c) Can a solar water heater replace an electric or gas water heater? Explain (5)

2. (a) Draw a block diagram of solar powered vehicles and explain the function of each system. (8)

   (b) Define solar constant. What are the reasons for variation in solar radiation reaching the earth than received at the outside of atmosphere? (6)

   (c) Explain the principle and working of photovoltaic cell. (6)

SECTION - B

3. (a) What are the different forms of bio-conversion processes? Briefly describe them stating salient characteristics. (10)

   (b) What is the present production level and use of hydrogen in the country? (5)

   (c) Explain the biochemical engineering strategies to enhance hydrogen production in photosynthetic algae. (5)

4. (a) Describe photosynthetic process stating all its necessary conditions (5)

   (b) State the various effects of using bio-diesel in I.C. engines. (5)

   (c) Write short notes on the following (Any two)

   (i) Hydrogen energy

   (ii) Bio-gas plants

   (iii) Cautions of bio-diesel (10)

SECTION - C

5. (a) Explain four problems which make it necessary to research an alternative to fossil fuels or powering vehicles. For each explain how hydrogen would solve the problem. (10)

   (b) Give your opinion on new technologies for powering vehicles and discuss some of the implications for India if we were to adopt hydrogen or electricity as the main vehicle fuel. (10)

6. (a) Write short notes on the following (Any two)

   (i) Design considerations of electric vehicles

   (ii) Traction motors

   (iii) Applicability of electric cars (10)

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(b) Compare the hydrogen fuel with petrol and diesel oils on the basis of physical, chemical, thermal properties of oil and engine emission. (10)

SECTION - D

7. (a) Write a short note: (i) Bio diesel (ii) Super charger (iii) Engine emission (iv) Transesterification processes. (12)

(b) Compare the vegetable oils with petrol and diesel oils on the basis of physical, chemical, thermal properties of oil and engine emission. (8)

8. (a) Compare petrol with cooking oil on the basis of emissions, fuel economy and acceleration.

(b) Explain the basic working design of turbocharger.

(c) Explain the problems associated with vegetable oils used as an engine fuel.

(d) How is the performance and fuel efficiency of the engine affected with vegetable oils?

(e) Explain the working principle of gas turbine used in cars. (5×4=20)

SECTION - E (Compulsory Question)

9. (a) Define the following terms:

(i) Hydrogen fuel cell

(ii) Hybrid cars

(iii) Solar attitude angle

(iv) Bio fuels (4×1=4)

(b) What are the potential environmental benefits of alternative fuels?

(c) What are the initiatives worldwide for the development of alternative fuels?

(d) How can hydrogen be used in transportation?

(e) Is it safe to carry hydrogen on a vehicle?

(f) What are the merits of vegetable oils?

(g) How does the production of biomass and ethanol affect the environment?

(h) What are the environmental impacts of Electrical Vehicles?

(i) Can a biomass boiler supply hot water in summer as well as heating in winter? (8×2=16)