Manipal Institute of Technology, Manipal
Constituent Institute of Manipal University

VI SEMESTER B.TECH (AUTOMOBILE ENGINEERING)
END SEMESTER EXAMINATIONS, JAN/MAY 2016

SUBJECT: ALTERNATE ENERGY SOURCES FOR AUTOMOTIVES
[AAE 380]
REVISED CREDIT SYSTEM

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:

❖ Answer **ANY FIVE FULL** the questions.
❖ Missing data may be suitable assumed.

1A. What are the differences between primary and secondary energy sources? (02)

1B. Discuss the phenomena of attenuation of beam radiation. (03)

1C. Define: (05)

   1. Altitude angle
   2. Zenith angle
   3. Declination angle
   4. Hour angle
   5. Latitude angle

2A. Calculate the angle made by the beam radiation with the normal to a flat plate (03)
collector, pointing due south located in new Delhi (28^0 38' N, 77^0 17' E) at 9:
00 hours, solar time on December 1. The collector is tilted at an angle of 36^0
with the horizontal.

2B. Sketch and explain a flat plate liquid collector. (03)

2C. Sketch and explain the constructional and functional features of central (04)
receiver type of collector.

3A. Explain thermosiphon solar water heating system. (02)

3B. Derive the expression to determine the collector's efficiency with the case of (04)
concentrating type of solar collectors.

3C. Differentiate continuous and batch types of bio digestion process. (04)

4A. Discuss the problems associated with the bio gas plant. (03)

4B. Design a biogas plant for a family having 25 dairy animals. Take dung production per animal in a day is 12 kg, density of the slurry 1020 kg/m^3 and 1 kg of dung produces 0.1 m^3 of gas. (04)

4C. What all factors has to be consideration for the filling up of digester to initiate the process of digestion. (03)

5A. Contrast the differences between fixed bed and fluidized bed type of gasifiers and explain any one of the designs for each case. (04)

5B. Sketch and explain the process of pyrolysis (destructive distillation). (03)

5C. Describe the energy saving facets of hybrid vehicles over conventional vehicles. (03)

6A. Discuss the power flow control diagram with the case of series parallel hybrid powertrain. (05)

6B. Compare speed coupling with torque coupling. (03)

6C. What is meant by acceleration resistance? Give the expression. (02)