Sardar Patel University
M.Sc. Renewable Energy

Semester : First   Course Code: PS01CREN01

Course Title: Fundamental of Renewable Energy Technology

Date: Saturday, 22.10.2016   Time: 10:00 AM to 1:00 PM

Total Mark: 70

Note: 1. All the questions are compulsory
**   2. Figures on the right bracket indicated marks**

Que. 1: Select suitable answer   9 Marks

i.   A systemized body of knowledge about any department of nature, internal or external to man is called ......
   a. Resources   c. Energy technology
   b. Energy science   d. None of the above

ii. Fuel cell uses .... as a fuel
   a. Water   c. Hydrogen
   b. Methane   d. Oxygen

iii. The unit of the luminous intensity is given in ....
   a. Meter   c. Mole
   b. Candela   d. Ampere

iv. The energy in the body by virtue of motion is called the ....
   a. Kinetic energy   c. Potential energy
   b. Power   d. Moment of inertia

v.   Heat can be transfer in basic mode/s ....
   a. Conduction   c. Convection
   b. Radiation   d. All of the above

vi. The emissivity and the absorptivity of surface at a given temperature and wavelength are equal is given by
   ....
   a. Stefan-Boltzmann law   c. Kirchhoff's law
   b. Fourier law   d. None of the above

vii. .... is the science of energy transfer and its effect on the physical properties of substances.
   a. Chemistry   c. Heat and mass transfer
   b. Environmental science   d. Thermodynamics

viii. The value of the absolute temperature is ....
   a. 273 °C   c. − 273 °C
   b. 373 °C   d. − 373 °C

ix. The degree of hotness or coldness is called ....
   a. Heat   c. Temperature
   b. System   d. Energy

①

(P.T.O)

Que. 2: Answer any seven short questions (Each que. Carry 3 marks)   **21 Marks**

i.   Explain Tidal current, Tidal current energy and tidal range with the help of diagram
ii.   A resistance oven is connected to a DC supply of 220 V. It takes 5A current. Calculate (i) Power (ii) Energy converted to heat in 5 hours.
iii.   Give base and derived units in SI systems
iv.   A 1000 kg car has velocity of 20 m/s. what is the kinetic of the car?
v.   A stationary mass of gas is compressed without friction from an initial state of 0.3 m³ and 0.105 MP$_a$ to a final state of 0.15 m³ and 0.105 MP$_a$, the pressure remaining constant during the process. There is transfer of 37.6 k kJ of heat from the gas during the process. How much the internal energy of the gas change?
vi.   Define and give formula for specific heat in brief
vii.   Define and give formula for latent heat
viii. Define renewable energy. Give advantages and limitations in general
ix.   A 100 kg car is moving at velocity of 60 km/h. What is kinetic energy of car?
x.   A electric motor at 1500 rpm drives a compressor by means of V belt drive. The diameter of pulley of 0.16 m and the tension in V belt is 150 N on one side and 50 N on other side. Find power of the motor.

Que. 3: A) What are the different sources of the renewable energy? Explain any one in details   **5 Marks**

B) What are the different energy resources and forms of energy   **5 Marks**

OR

Explain energy management, energy conservation and energy audit.

Que. 4: A) State the rules for writing the SI units in details   **5 Marks**

     5 Marks

B) A 15 kW rated electric motor pump raises 500 kg water through a height of 80 m to an overhead tank. Efficiency of the motor is 80%. Calculate a) Time required; b) Energy consumed from main supply; c) Potential energy acquired by water

OR

A flywheel of 1000 kg mass and 10 m radius is revolving at a speed of 10,000 rpm. Calculate the stored kinetic energy.

Que. 5: A) Define conduction and explain in details with suitable diagram   **5 Marks**

B) What is transmissivity? Explain in details with suitable diagram   **5 Marks**

OR

A long convoluted pipe is 3 m long carrier water (C$_f$= 4185 J/kg °C) at a rate of 0.01 kg/sec. Inlet temperature of ater is 10 °C and the walls of the pipe are maintained at 50 °C. The flow is laminar and the average heat transfer coefficient (U$_L$) is 6 W/m °C. Find the exit temperature of water and determine the heat extraction rate. Also calculate above parameter s for reduced rate of 0.005 kg /sec.

Que. 6: A) Explain the first law of closed system undergoing a cycle with suitable diagram   **5 Marks**

B) Define Carnot cycle and explain in details with suitable diagram   **5 Marks**

OR

Water flows through a turbine in which friction causes the water temperature to rise from 35 °C to 37 °C. If there is no heat transfer, how much does the entropy of the water change in passing through the turbine?