

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), April-May 2016

B. Tech/ M. Tech (as applicable) in ...Electrical.....Engineering, Semester VI.....

Roll No.....

COURSE CODE: EE604

Time: 3 hours

Max. Marks: 100

COURSE TITLE: Non-conventional Energy systems

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. Heating value of producer gas is
 - (a) 4-8 MJ/m³
 - (b) 14-18 MJ/m³
 - (c) 24-28 MJ/m³
 - (d) 34-38 MJ/m³
- ii. Bio-diesel is
 - (a) Obtained from fermentation of sugars
 - (b) Obtained from pyrolysis process
 - (c) Exudates of plants
 - (d) An upgrade vegetable oil
- iii. The temperature in the crust increases with depth at a rate of about
 - (a) 300 °C/km
 - (b) 10°C/km
 - (c) 1°C/km
 - (c) 30 °C/km
- iv. The turbine used in a tidal range plant is a
 - (a) Pelton turbine
 - (b) Kaplan turbine with variable pitch blades
 - (c) Kaplan turbine with fixed pitch blades
 - (d) Francis turbine
- v. Pumping of water from ocean to basin during high tide
 - (a) Increases the net energy generation
 - (b) Decreases the net energy generation
 - (c) Helps in uniform power generation
 - (d) Decreases the net tidal range
- vi. The minimum temperature difference between source and sink required by a practical heat engine is
 - (a) 540°C
 - (b) 120°C
 - (c) 10°C
 - (d) 20°C
- vii. Liquefaction of biomass is carried out at
 - (a) High temperature and low pressure
 - (b) Relatively low temperature and high pressure
 - (c) Relatively low temperature and normal pressure
 - (d) Room temperature and high pressure



- viii. A horizontal surface receives
 - (a) No reflected component of radiation
 - (b) 50% of the reflected component of radiation
 - (c) 50% of the diffused component of radiation
 - (d) 50% of the beam component of radiation
- ix. Which one of the following statement is not true for a micro hydro scheme?
 - (a) It has a capacity less than 100 kW
 - (b) It is used where a grid does not exist
 - (c) Power is generated for local use only
 - (d) A complicated and sophisticated control scheme is used
- x. OTEC is characterized as having
 - (a) High efficiency and low installation cost
 - (b) Low efficiency and high installation cost
 - (c) Low efficiency and low installation cost
 - (d) High efficiency and high installation cost

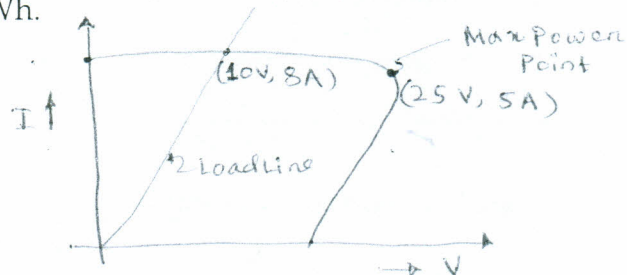
Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
(i)	Define <i>Pelletization</i> .	
(ii)	Draw a schematic symbol of photovoltaic cell, draw the I-V characteristics, maximum power point and P-V characteristics.	
(iii)	Write down the functions of pyranometer, pyrliometer, Sunshine Recorder.	
(iv)	What is the routine followed in Single-basin, double effect tidal energy conversion scheme.	
Q.3A	Discuss various types of speed governors used in SHPs. Which type is justified in a micro hydro scheme?	05
Q.3B	Draw a schematic layout of linked-basin tidal plant and explain it's operation.	05
Q.4A	What are the relative advantages and limitations of floating and shored-based OTEC plants?	05
Q.4B	Describe various energy extraction technologies used with hydrothermal resources.	05
Q.5A	Describe various stages of exploration and development of geothermal resources.	05
Q.5B	With the help of neat diagram explain the working of a gasifier using wood-chip biomass. What further processing is required to use the gas produced in a diesel engine.	05
Q.6A	Explain the process of gasification of solid bio-fuels. What is the general composition of the gas produced and what is it's heating value? What are it's main applications?	05
Q.6B	With neat diagram explain the working of Updraft and crossdraft type gassifier.	05
OR		
Q.6B	A PV system feeds a dc motor to produce 1 hp power at the shaft. The motor efficiency is 85%. Each module has 36 multicrystalline silicon solar cells arranged in 9x4 matrix. The cell size is 125mm x 125mm and the cell efficiency is	05

12%. Calculate the number of modules required in the PC array. Assume global radiation incident normally to the panel as $1\text{kW}/\text{m}^2$.

Q.7A What are the affecting the distribution of wind energy on the surface of Earth. 05
Give a comparison between global winds and local winds.

Q.7B Explain the construction and working of modified flat-plate collector. 05
OR

Q.7B A PV source having IV characteristics as shown in the figure is supplying power to a load whose load line intersects the characteristics at (10V, 5A). Determine the additional power gained if an MPPT is interposed between the source and the load. If the cost of the MPPT is Rs-4000.00, for how long does the system need to operate in order to recover the cost of MPPT? The cost of electricity may be assumed Rs-3.00 per kWh.



Q.8A With neat diagram explain the following Tidal energy conversion schemes- 10
(i) Single basin: single effect
(ii) Single basin: Double effect
(iii) Two basin: linked basin

Q.9A Explain the cell Mismatch in a module and effect of shadowing. 10

Q.9B With necessary diagrams write short notes on 10
(i) Stand-Alone solar PV system
(ii) Grid-interconnected solar PV system

OR

Q.9B With necessary diagrams explain all the terms related to solar radiation geometry 10

- (i) Angle of latitude(ϕ)
- (ii) Declination(δ)
- (iii) Hour angle(ω)
- (iv) Inclination angle(α)
- (v) Zenith angle(θ_z)
- (vi) Solar azimuth angle(γ_s)
- (vii) Tilt angle(β)



Best of Luck!