Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination
July/August, 2017

Level : B.E.
Year : IV
Course : MEPP 428
Semester : II
Exam Roll No. :
Time : 30 mins.
F. M. : 20
Registration No. :
Date JUL 27 2017

SECTION "A"
[10 Q. × 1=10 marks]

Mark [√] for the most appropriate answer (s).

1. A liquid flat plate collector is usually held tilted in a fixed position, facing _____ if located in the southern hemisphere.
(a) North (b) South (c) East (d) West

2. The collection efficiency of a Flat plate collector can be improved by
(a) Putting a non-selective coating on the plate
(b) Evacuating the space above the absorber plate
(c) Removing the glazing of the collector
(d) Placing horizontally in our geography

3. The efficiency of various types of collectors' _____with _____temperature of absorber.
(a) Increases, decreasing (b) Decreases, increasing
(c) Remains same, increasing (d) Depends upon type of collector

4. Which one of the following best describes or defines Biomass?
(a) Natural gas
(b) Petroleum
(c) Inorganic matter that can be converted to fuel
(c) Organic matter that can be converted to fuel

5. The energy which is not derived from the sun is _____
(a) biomass (b) fossil fuels (c) nuclear energy (d) geothermal energy

6. Which of the following is the biggest source of biogas in rural Nepal
(a) Kitchen waste (b) Leaves (c) Cattle dung (d) Industrial waste

7. The amount of energy available in the wind at any instant is proportional to ___ of the wind speed
(a) Square root power of two (b) Square power
(c) Square root power of three (d) Cube power

8. A typical spacing between turbines in a wind farm in terms of their rotor diameters D is approximately
(a) 4D × 7D (b) 2D × 3D (c) 10D × 12D (d) 15D × 20D

9. The mean wind speed at site A for a wind farm is 10% higher than at site B. What would be the expected increase in electricity production at site A compared to site B?
(a)10% (b) 28% (c) 30% (d) 33%

10. A factory is in a region where the insolation is 2000 kWh m^{-2} y^{-1}. What approximate area of solar panels with 17% efficiency would be required to produce 100.000 kWh of electricity per annum?
(a) 200 m^2 (b) 300 m^2 (c) 400 m^2 (d) 450 m^2

SECTION "B"

[10 Q. × 1 = 10 marks]

11. _____digestion is the decomposition of organic matter in the absence of air by microorganisms.

12. The energy density of renewable sources as compared to the conventional sources is _____

13. The typical capacity factor of a wind turbine is _____

14. The fraction of power in the wind that a modern wind turbine can extract is approximately _____

15. The typical capacity factor of solar PV is _____

16. The maximum selective coated flat plate collector standstill temperature at 1000 W/m2 irradiance and 30°C ambient temperature is _____ (use given characteristic curve, Fig 1).

17. Depth of discharge (DOD) is defined as the _____of battery capacity that has been discharged.

18. The fill factor (FF) is the ratio of _____

19. 25 kg of cattle dung is available for anaerobic digestion plant in Chitwan which is operated with 50 days of hydraulic retention time (HRT). The size of the overall anaerobic digester is _____including 25% of digester volume for biogas storage.

20. Time required to heat the fuel to the pyrolysis temperature is much shorter than the characteristic pyrolysis reaction time is called _____pyrolysis.

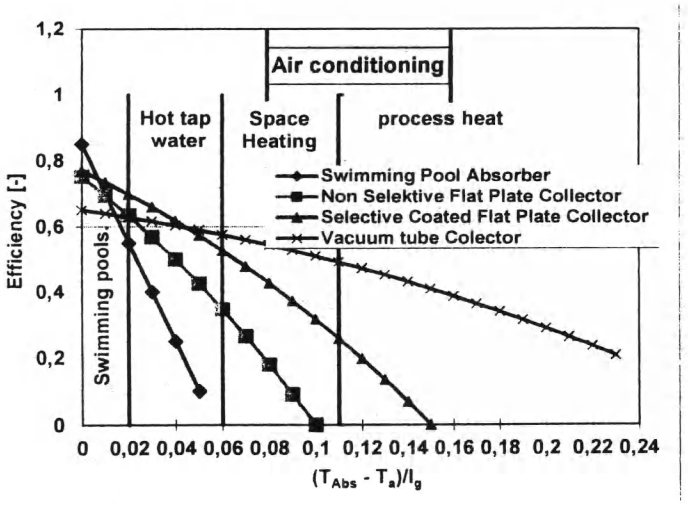

Figure 1

KATHMANDU UNIVERSITY
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JUL 2 7 2017

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SECTION "C"

Attempt *ALL* questions. Assume suitable data if any is missing.

1. What is anaerobic digestion? How domestic biogas system is relevant for the national development? Discuss briefly about different types of bio digester used in domestic biogas system and the biochemical process of anaerobic digestion. [1+3+3+4]

2. What is your opinion on current world energy scenario? How do you evaluate the policies and strategies ofNepal's renewable energy development program? What do you suggest for the sustainable development of renewable energy sector in Nepal? [3+4+4]

3. Discuss briefly how electricity is generated from solar photovoltaic (PV). Explain with the help of schematic diagram grid connected and off-grid solar PV system. A house in Dhulikhel has following electric energy requirements. You are asked to estimate PV panel, charge controller and battery sizing for DC supply system. [2+4+5]

Lights in	Power Rating , W	Time used, Hrs
Kitchen (Total)	100	4
Living (Total)	100	4
Bed Room	140	2

4. Briefly discuss about the concept of power extraction from wind and the wind tower spacing in a wind farm. Do you think wind resource assessment (WRA) is pivotal for the installation of wind turbine, why? An anemometer is mounted at a height of 10m above a surface with crops, hedges and shrubs shows a wind speed of 5m/s. Estimate the wind speed and the specific power in the wind at a height of 50m. Assume 15°C, 1 atm and friction coefficient (α) = 0.2). [3+2+3+3]

5. Briefly explain about pyrolysis and gasification process. Discuss working principle of updraft gasifier with the help of necessary diagram. Discuss the working principle and thermal losses of the collector with the help of schematicdiagram of the solar flat plate collector. [3+3+3+2]