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| **Name:**<br>**Enrolment No:** | UPES<br>UNIVERSITY WITH A PURPOSE |

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**
**Online End Semester Examination, Dec 2020**

**Course**: **Solar Thermal Technologies** **Semester: VII**
**Program: B. Tech. ME** **Time 03 hrs.**
**Course Code: MECH 4016P** **Max. Marks: 100**

**SECTION A**

1. **Each Question will carry 5 Marks**
2. **Instruction: Complete the statement / Select the correct answer(s)**

| S. No. | **Question** | **Marks** | **CO** |
|---|---|---|---|
| Q 1 | Define the terms (i) Beam radiation (ii) Diffused radiation. | 5 | CO1 |
| Q 2 | Discuss three main advantages of testing of solar collectors- ASHARE standard | 5 | CO2 |
| Q 3 | Discuss the main three advantages of solar dryer? | 5 | CO1 |
| Q 4 | Describe the central power receiving system? | 5 | CO1 |
| Q 5 | Discuss main two applications of Desiccant cooling? | 5 | CO1 |
| Q 6 | For a parabolic collector of length 2m, the angle of acceptance is $15^{o}$. Find the concentration ratio of the collector. | 5 | CO3 |

**SECTION B**

1. **Each question will carry 10 marks**
2. **Instruction: Write short / brief notes**

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| Q 7 | Discuss the parameters governing the performance of flat plate collectors. | 10 | CO2 |
| Q 8 | Calculate the angle made by beam radiation with the normal to a flat plate collector on May 1 at 0900h (local apparent time). The collector is located in New Delhi ($28^{O}35'$N, $77^{O}12'$E). It is tilted at an angle of $36^{O}$ with the horizontal and is pointing due south. Assume any data, if missing. | 10 | CO4 |
| Q 9 | Explain briefly (i) Compound parabolic collector (ii) Thermodynamics limit to concentration. | 10 | CO3 |
| Q 10 | Explain solar desalination? Discuss the principle of operation on which the solar desalination works. | 10 | CO2 |
| Q 11 | A Carnot engine working between $400^{O}$C and $40^{O}$C products 130kJ of work. Determine: (i) The engine thermal efficiency (ii) The heat added (iii) The entropy changes during heat rejection process. Assume any data, if missing.<br>OR | 10 | CO4 |

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| | Compute the monthly average hourly solar flux received on a flat plate collector facing due south ($\gamma = 0^o$) having a slope of $12^o$. The collector is located at a place $15^0 00'$N on 20th day of October. The data given are: Time 11:12h(local apparent time), $H_g = 2408 kJ/m^2/h$ , $H_d = 1073 kJ/m^2/h$ , Ground reflectivity, $\rho = 0.25, \omega = 7.5^0$ . Assume any data, if missing. | | |
| **Section C**<br>**1. Each Question carries 20 Marks.**<br>**2. Instruction: Write long answer.** | | | |
| Q 12 | Explain briefly the various types of solar radiation measurement instruments.<br>OR<br>Discuss the differentiate between absorption cooling and passive desiccant cooling methods using solar energy. | 20 | CO3 |