

**DIPLOMA IN MECHANICAL ENGINEERING  
(DME) / ADVANCED LEVEL CERTIFICATE  
COURSE IN MECHANICAL ENGINEERING  
(DMEVI / ACMEVI)**

**Term-End Examination**

**December, 2016**

00682

**BME-052 : BASICS OF THERMAL ENGINEERING**

*Time : 2 hours*

*Maximum Marks : 70*

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*Note : Answer any seven questions. All questions carry equal marks. Use of scientific calculator, Steam tables and Mollier diagram is permitted. Assume missing data, if any.*

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1. Nitrogen gas is compressed in a reversible process in a cylinder from 100 kPa, 20°C to 500 kPa. During the compression process, the relation between pressure and volume is  $PV^{1.3} = C$ . Calculate the work and heat transfer per kg during this process. 10
2. How are boilers classified ? Compare the fire tube and water tube boilers. 10

3. Explain the Clausius Statement of Second Law of Thermodynamics. 10
4. List the Boiler Accessories and discuss their importance in brief. 10
5. Explain the principle of "Regenerative Cycle" with diagram. 10
6. Explain with the help of suitable diagram the components of evaporative cooling tower. 10
7. What is Radiation ? Explain the different radiation properties of the surfaces. 10
8. What is Geothermal Energy ? Explain the two types of geothermal systems with diagrams. 10
9. Determine whether water at the following states is a compressed liquid, a superheated vapour or a mixture of saturated water steam : 10
- (a) 18 MPa,  $0.003 \text{ m}^3/\text{kg}$
- (b)  $130^\circ\text{C}$ , 200 kPa
10. 60 litres of air at  $70^\circ\text{C}$  expands from 7 Bar to 1.05 Bar according to the law  $PV^n = C$ . The volume of air after expansion is 300 litres. Determine
- (a) the mass of air, and
- (b) the work done during the process. 10
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