PEC UNIVERSITY OF TECHNOLOGY, CHANDIGARH

16101008

End-Term Examination
November, 2017

Programme: B.E. (Aerospace Engineering) | Year/Semester: 2^{nd} Year (3^{rd} Sem.)

Course Name: **Thermodynamics** | Course Code: **ESC 201**

Maximum Marks: **100** | Time allowed: **3 Hrs**

Notes:
1. All questions are compulsory.
2. Unless stated otherwise, the symbols have their usual meanings in context with subject. Assume suitably and state, additional data required, if any.
3. The candidates, before starting to write the solutions, should please check the question paper for any discrepancy, and also ensure that they have been delivered the question paper of right course code.
4. Use of steam tables/charts is allowed.

Q. No.		Marks
1.	(a) Explain the concept of macroscopic and microscopic viewpoints applied to the study of thermodynamics. (b) Define thermodynamic systems. Classify and differentiate them. (c) Define specific heat? Why gases have two specific heats?	3 4 3
2.	(a) Point out the salient features of a free expansion process. (b) Write the steady flow energy equation and point out the significance of various terms involved.	6 4
3	Explain the establishment of thermodynamic temperature scale. Why the thermodynamic temperature scale is called the absolute temperature scale?	10
4	(a) Discuss the availability of a steady flow system. (b) Account for the existence of two values for specific heat of a gas, and derive the relation between them and the characteristic gas constant.	5 5
5.	Steam enters the nozzle, operating at steady state at 30 bar and 350^0C with negligible velocity and exits at 15 bar and a velocity of 500 m/s. The mass-flow rate is 2.22kg/s. Determine ~~(a) the exit temperature of steam~~; and (b) exit area of nozzle.	10
6.	(a) In a piston-cylinder arrangement, the pressure is inversely proportional to the square of the volume. The initial pressure is 10 bar in the cylinder and the initial volume is 0.1 m3. The volume is now changed so that the final pressure is 2 bar. Find the work done in kJ. (b) A slow chemical reaction takes place in a fluid at a constant pressure of 0.1 MPa. The fluid is surrounded by a perfect heat insulator during reaction, which begins at the state 1 and ends at the state 2. The insulation is then removed and 105 kJ of heat flows to surroundings as the fluid goes to the state 3 The following data are observed for fluid at states 1,2,	5 5