Name: Score:

38 Written questions

Term 1 of 38

For isothermal flow, pressure is proportional to what power of density?

Term 2 of 38

How do static values of pressure, temperature and density vary when the gas undergoes compression, such as at a stagnation point? they all go _____.

Term 3 of 38

The critical pressure ratio required to achieve sonic condition is

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Term 4 of 38

Carl de Laval of Sweden was the first to make industrial use of converging-diverging _____ to achieve much higher RPMs in a steam turbine.

Term 5 of 38

Is the Energy Equation very important in the study of compressible flows?

Term 6 of 38

On physical grounds, at the same temperature, is the speed of sound higher in water than in air?

Term 7 of 38

In an _____ flow, the total temperature remains constant.

Term 8 of 38

Higher the flow Mach number (M1) ahead of a normal shock, _____ the Mach number behind the shock/

Term 9 of 38

Chuck Yeager's historic first _____ flight took place in the year 1947, only two years after the end of WWII.

Term 10 of 38

Speed if sound in a gas is the speed of propagation of _____ pressure disturbances through the gas.

Term 11 of 38

Prandtl relation can be written as: _____; where a* represents the speed of sound computed from flow being at _____ conditions.

Term 12 of 38

For isentropic flow, pressure is proportional to what power of density (give the symbol)?

Term 13 of 38

A _____ perfect gas is one for which, CP(T), CV(T) are both function of T and not constant.

Term 14 of 38

How does entropy vary across a shock wave?

Term 15 of 38

What type of pressure remains constant in an isentropic flow?

Term 16 of 38

T or F: When the flow Mach number ahead of a normal shock is increased infinitely, the flow density behind the shock also reaches infinity.

Term 17 of 38

Give the equation for the speed of sound in a gas:

Term 18 of 38

Is the propagation of sound speed in air as an isentropic process?

Term 19 of 38

Can we analytically solve the theta-beta-M relation for beta?

Term 20 of 38

A _____ perfect gas is one for which: cp and cv are constant.

Term 21 of 38

Rankin-Hugoniot relation across a normal shock gives us the pressure jump p2/p1 as function of (Mach number, M1; or density ratio rho2/rho1 across the shock; or entropy jump, s2/s1).

Select one

Term 22 of 38

_____ flow refers to a constant-entropy flow.

Term 23 of 38

Has the shock wave system of an aircraft in flight ever been recorded?

Term 24 of 38

The _____ law of thermodynamics allows us to predict the direction that physical processes take.

Term 25 of 38

In an adiabatic flow, the total _____ remains constant.

Term 26 of 38

There is a portion of any curved shock wave that is _____ to the stagnation streamline.

Term 27 of 38

We can not have an expansion shock (i.e., p2 < p1), because this would violate the _____ law of thermodynamics. The critical pressure ratio required to achieve sonic condition is _____.

Term 28 of 38

Give the equation for calculating the Mach angle mu:

Term 29 of 38

Tor F: The stagnation pressure across a normal shock (i.e., p02) is higher than the stagnation pressure in front of the shock (p01). This variation is the same as static pressure jump (i.e., p2 > p1).

Term 30 of 38

We have a _____ perfect gas for T < 1000 K.

Term 31 of 38

At very high temperature where dissociation and ionization degree of freedom are important, then air's specific heat ratio gamma = Cp/Cv would be: increased, decreased, unchanged. (gamma < 1.4; gamma > 1.4, always equal to 1.4)

(Select one)

Term 32 of 38

The critical _____ ratio required to achieve sonic condition is _____ (Mach # = 1).

Term 33 of 38

The Mach number downstream of a/an _____ shock wave is always subsonic.

Term 34 of 38

In _____, the total stagnation pressure remains constant.

Term 35 of 38

What type of pressure jump jumps up across a shock wave?

Term 36 of 38

A/an _____ and reversible process is called isentropic.

Term 37 of 38

Does the second law of thermodynamics allow the process where the entropy for the system and surroundings decrease?

Term 38 of 38

A curved shock wave is also called a __ shock wave, usually created by blunt object in supersonic flight, such as the Space Shuttle Orbiter.
