

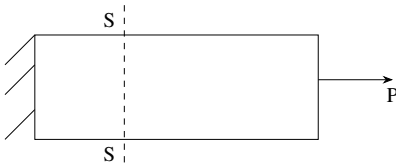
AE-2015 14-26

AI24BTECH11012- Pushkar Gudla

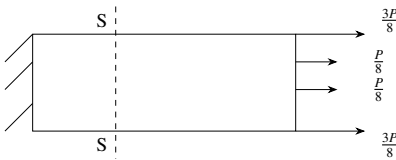
- 1) A cantilever with thin-walled channel cross section is subjected to a lateral force at its shear center. The cantilever undergoes.
 - a) bending without twisting
 - b) bending and twisting
 - c) neither bending nor twisting
 - d) twisting without bending
- 2) The two non-zero principal stresses at a point in a thin plate are $\sigma_1 = 25$ MPa and $\sigma_2 = -25$ MPa. The maximum shear stress(in MPa) at this point is _____.
- 3) Consider the density and altitude at the base of an isothermal layer in the standard atmosphere to be ρ_1 and h_1 , respectively. The density variation(ρ versus h) in that layer is governed by (R :specific gas constant, T :temperature, g_o acceleration due to gravity at sea level)
 - a) $\frac{\rho}{\rho_1} = e^{\frac{g_o}{RT}(h-h_1)}$
 - b) $\frac{\rho}{\rho_1} = e^{\frac{g_o}{RT}(h_1-h)}$
 - c) $\frac{\rho}{\rho_1} = e^{\frac{RT}{g_o}(h-h_1)}$
 - d) $\frac{\rho}{\rho_1} = e^{\frac{RT}{g_o}(h_1-h)}$
- 4) For constant free stream velocity and density, a change in lift for a large aspect ratio straight wing with thin cambered section at small angles of attack, leads to:
 - a) a shift of the aerodynamic center and no shift of the center of pressure
 - b) a shift of the center of pressure and no shift of the aerodynamic center
 - c) shift of both the aerodynamic center and center of pressure
 - d) no shift either of the aerodynamic center or of the center of pressure
- 5) Which of the following modes of a stable aircraft has non-oscillatory response characteristics?
 - a) Short period
 - b) Phugoid
 - c) Dutch roll
 - d) Spiral
- 6) As a candidate for vertical tail which one of the following airfoil sections is appropriate?
 - a) NACA 0012
 - b) NACA 2312
 - c) NACA 23012
 - d) Clarke Y profile
- 7) The primary purpose of a trailing edge flap is to
 - a) avoid flow separation
 - b) increase $C_{l,max}$
 - c) reduce wave drag
 - d) reduce induced drag
- 8) Which one of the following aero engines has the highest propulsive efficiency?
 - a) Turbojet engine without afterburner
 - b) Turbojet engine with afterburner
 - c) Turbofan engine

- d) Ramjet engine
- 9) The stoichiometric fuel-to-air ratio in an aircraft engine combustor varies with the compressor pressure ratio as follows:
- increases linearly
 - decreases linearly
 - is independent
 - increases nonlinearly
- 10) A rocket engine produces a total impulse of $112kN.s$ in a burn time period of 3.5 minutes with a propellant mass flow rate of $0.25kg/s$. The effective exhaust velocity (in m/s) of gas ejecting from the engine is _____.
- 11) The function $y = x^3 - x$ has
- no inflection point
 - one inflection point
 - two inflection points
 - three inflection points
- 12) A $0.5kg$ mass is suspended vertically from a point fixed on the Earth by a spring having a stiffness of $5N/mm$. The static displacement(in mm) of the mass is _____.
- 13) A slender structure is subjected to four different loading (I, II, III and IV) as shown below(Figures not to scale). Which pair of cases results in identical stress distribution at sections S-S located far away from both ends?

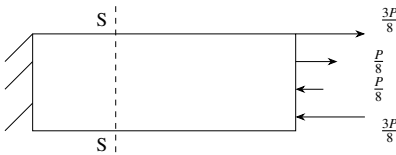
[I]



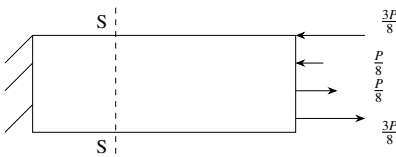
[II]



[III]



[IV]



- a) I and II
- b) II and III
- c) III and IV
- d) IV and I