# EE-2007 52-68

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 seperation
   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:

a) increases linearly
b) decreases linearly
c) is independent
d) 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

a) no inflection point
b) one inflection point
c) two inflection points
d) 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 pf cases results in identical stress distribution at sections S-S located far away from both ends?
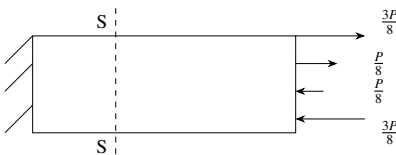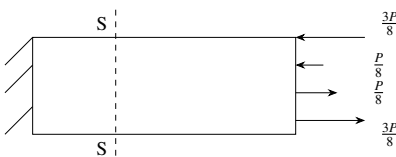
[I]
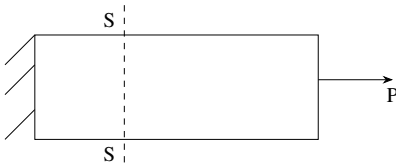
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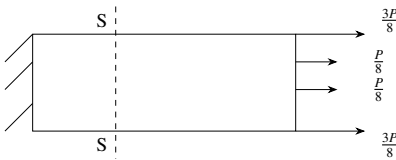
[III]

[IV]

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