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＊請在答案卡內作答

Available constants and units

$c = 3\times10^{8}$ m/s, $e = 1.602\times10^{-19}$ C, $G = 6.67\times10^{-11}$ Nt.m^2/kg^2

$h = 6.63\times10^{-34}$ J.s, $k = 1.38\times10^{-23}$ J/K, $R = 8.31$ J/mol.K

$m_e = 9.1\times10^{-31}$ kg, $\varepsilon_0 = 8.854\times10^{-12}$ C^2/Nt.m^2, $\mu_0 = 4\pi\times10^{-7}$ Wb/A.m

$g = 9.8$ m/s^2, 1 hp =746 W

單選 (25 題，每題 4 分)

1. A car of mass 2000 kg, can reach a speed of 100 Km/h in 10 sec. What is the average power needed to accomplish this? (A) 103.6 hp, (B) 77.3 hp, (C) 103.6 kW, (D) 77.3 kW.
2. Ten bricks, each 10 cm thick and mass 1 kg, lie on a flat floor. How much work is required to stack them on top of one another? Assume the bricks have uniform density. (A) 40 J, (B) 44.1 J, (C) 49.5 J, (D) 55 J.
3. The moment of inertia of a solid sphere is $2MR^2/5$, hollow sphere is $2MR^2/3$, solid cylinder is $MR^2/2$, and hollow cylinder is MR^2. All of the same mass M and the same outer radius R. If these four objects are released from rest at the top of an incline and start rolling without sliding. Which one will the last arrive at the bottom? (A) solid sphere, (B) hollow sphere, (C) solid cylinder, (D) hollow cylinder.
4. Assume the earth is a prefect sphere with uniform density and the radius is 6400 km. What is the difference of gravitational acceleration at equator and at north pole？ (A) 0.017 m/s^2, (B) 0.034 m/s^2, (C) 0.17 m/s^2, (D) 0.34 m/s^2.
5. The period of T of a simple pendulum of length L is given by $T = 2\pi(L/g)^{1/2}$. When it is taken to a mountain top it lose 1 min per day. What is the height of the mountain? (A) 3 km, (B) 3.55 km, (C) 4 km, (D) 4.55 km.
6. Which function does not represent traveling wave. (A) $A*\sin^2[\pi(t-x/v)]$, (B) $A*\cos(kx-\omega t)^2$, (C) $A*(x+vt)^3$, (D) $A*\sin[(kx)^2-(\omega t)^2]$.
7. A mass of 1 kg attached to a spring with a spring constant of 100 Nt/m oscillates horizontally on a smooth frictionless table with amplitude of 0.5 m. When the mass is 0.25 m away from equilibrium, determine the total mechanical energy. (A) 3.125 J, (B) 9.375 J, (C) 12.5 j, (D) 15.625 J.
8. The Carnot cycle consists of (A) two adiabatic processes and two isochoric processes, (B) two isothermal processes and two isobaric processes, (C) two isothermal processes and two adiabatic processes, (D) two isobaric processes and two isochoric processes.
9. Solar radiation supplies approximately 1 kW/m^2 at the earth's surface. A 3 m x 2 m solar collector is used to heat water. If the required temperature rise is 40^{o}C, what is the

注意：背面有試題