

Instructions:

Answer 3/4 out of the 5/6 questions. No extra credit will be given for more than ?? answers. If more than ??? questions are attempted, CLEARLY indicate which questions are to be graded, otherwise only the first ??? answers will be graded, and the rest ignored. Show all calculation steps to ensure that partial credit is earned, even if the final answer is incorrect. In cases where the answer is obviously wrong, some credit will be given if you identify this as an improbable answer.

Note: All information is given in metric and English units. You may select the units of your choice for each of the questions. **However do NOT use different unit systems within a single question.**

The following Equations are given:

$$\begin{aligned} \text{Power} &= 2\pi * T * N / 60,000 \\ P_{fc} &= m_f * H_g / 3600 \\ P &= (\text{MEP}) * D * N / (60,000 * r_c) \\ D &= A_p * L * n / 1000 \end{aligned}$$

$$\begin{aligned} \text{Power} &= 2\pi * T * N / 33,000 \\ P_{fc} &= (m_f * H_g) * 778 / (33000 * 60) \\ P &= (\text{MEP}) * (D/12) * N / (33,000 * r_c) \\ D &= A_p * L * n \end{aligned}$$

Units Conversions

1 BTU = 778 ft.lb of work
 33000 ft.lb/min = 1 Hp
 550 ft.lb/sec = 1 Hp
 1 gal = 231 cubic inches
 1 mile = 5280 ft

1 kN.m = 1 kJ
 1 kJ/sec = 1 kW
 1000 liters = 1 m³
 1000 cm³ = 1 liter

1 Hp = 0.7457 kW
 1 ft.lb = 1.356 N.m
 1 pound force = 4.45 Newton
 1 gal = 3.785 liters
 1 psi = 6.8948 kPa
 1 inch = 0.0254 meters
 1 ft = 0.3048 meters
 1 BTU = 1.0551 kJ

$$\text{Force (N)} = \text{mass(kg)} * \text{gravity(m/s}^2) \quad 1 \text{ (N)} = 1 \text{ (kg)} * 9.8 \text{ (m/s}^2)$$