
UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Kedua
Sidang Akademik 2006/2007
*Second Semester Examination
2006/2007 Academic Session*

April 2007
April 2007

ESA 486/3 – Senibina Pelancar
Launcher Architecture

Masa : [3 jam]
Hour : [3 hours]

ARAHAN KEPADA CALON :
INSTRUCTION TO CANDIDATES:

Sila pastikan bahawa kertas soalan ini mengandungi **SEBELAS (11)** mukasurat termasuk lampiran dan **TIGA (3)** soalan sebelum anda memulakan peperiksaan.
*Please ensure that this paper contains **ELEVEN (11)** printed pages included attachment and **THREE (3)** questions before you begin examination.*

Jawab **TIGA (3)** soalan sahaja.
*Answer **THREE (3)** questions only.*

Jawab semua soalan dalam Bahasa Malaysia.
Answer all questions in Bahasa Malaysia.

Setiap soalan mestilah dimulakan pada mukasurat yang baru.
Each questions must begin from a new page.

1. Di bawah ialah data yang digunakan untuk tentukan nisbah jisim tangki bahan bakar kepada jisim bahan bakar (PT2P) bagi Micron.

Diameter tangki, $D = 0.7 \text{ m}$
 Nisbah percampuran, $K_G = 2.3$
 Pemalar keselamatan, $f = 1.875$
 Bahan dorong 1 = Oksigen + Kerosen
 Bahan dorong 2 = N_2O_4 + UDMH
 Bahan untuk tangki = Aloi aluminium (Magnesium 7%)
 Ketumpatan O_2 , $\rho = 1130 \text{ kg/m}^3$
 Ketumpatan N_2O_4 , $\rho = 1450 \text{ kg/m}^3$
 Ketumpatan Kerosene, $\rho = 800 \text{ kg/m}^3$
 Ketumpatan UDMH, $\rho = 789 \text{ kg/m}^3$
 Ketumpatan Aloi aluminium (Magnesium 7%), $\rho = 2640 \text{ kg/m}^3$
 Tegasan (tegangan), $\sigma_T = 400 \text{ MPa}$
 Tegasan (mampatan), $\sigma_C = 240 \text{ MPa}$
 Ketebalan minimum yang diperlukan, $\delta = 1.5 \text{ mm}$
 Tekanan dalaman (TPS) = 0.45 MPa
 Tekanan dalaman (PFS) = 2.0 MPa

The following data is used to determine the ratio of the propellant tank mass to the propellant mass (PT2P) for Micron.

*Tank diameter, $D = 0.7 \text{ m}$
 Mixture ratio. $K_G = 2.3$
 Safety coefficient, $f = 1.875$
 Propellant 1 = Oxygen + kerosene
 Propellant 2 = N_2O_4 + UDMH
 Tank material = Aluminum alloy (Magnesium 7%)
 Density O_2 , $\rho = 1130 \text{ kg/m}^3$
 Density N_2O_4 , $\rho = 1450 \text{ kg/m}^3$
 Density Kerosene, $\rho = 800 \text{ kg/m}^3$
 Density UDMH, $\rho = 789 \text{ kg/m}^3$
 Density Aluminum Alloy (Magnesium 7%), $\rho = 2640 \text{ kg/m}^3$
 Stress (tension), $\sigma_T = 400 \text{ MPa}$
 Stress (Compression), $\sigma_C = 240 \text{ MPa}$
 Minimum thickness required. $\delta = 1.5 \text{ mm}$
 Internal pressure (TPS) = 0.45 MPa
 Internal pressure (PFS) = 2.0 MPa*