POLITEKNIK
MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENGAJIAN TINGGI

JABATAN KEJURUTERAAN MEKANIKAL

PENILAIAN ALTERNATIF BERIKUTAN
PELAKSANAAN PERINTAH KAWALAN BERSYARAT

SESI JUN 2020

DJJ30093 / DJJ3053 : ENGINEERING MECHANICS

NAMA PENYELARAS KURSUS : DR. ASNIZAH BINTI SAHEKHAINI

KAEDAH PENILAIAN : PEPERIKSAAN ONLINE

JENIS PENILAIAN : SOALAN ESEI BERSTRUKTUR (2 SOALAN)

TARIKH PENILAIAN : 29 JANUARI 2021

TEMPOH PENILAIAN : 1 JAM

INSTRUCTION:
This section consists of **TWO (2)** structured essay questions. Answer **ALL** questions.

ARAHAN :
*Bahagian ini mengandungi **DUA (2)** soalan esei berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1
SOALAN 1

CLO2
C3

(a) If the bucket weighs 60 kg as shown in **Figure 1(a),** calculate the tension developed in each of the wires.

*Jika jisim bakul 60 kg seperti **Rajah 1(a)**, kirakan tegangan yang terhasil di dalam setiap wayar.*
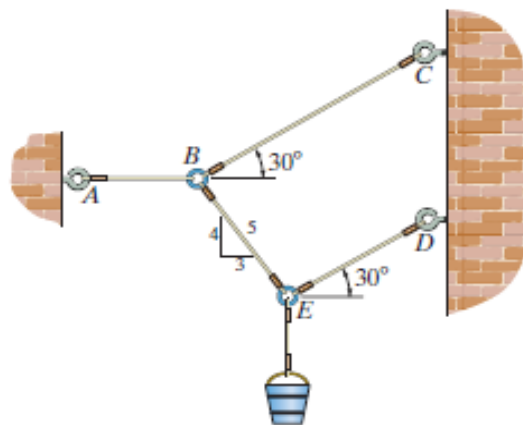
[15 marks]
[*15 markah*]

Figure 1 (a) / *Rajah 1 (a)*

CLO2
C3

(b) Calculate the force in each member of the truss and state if the members are in tension or compression as shown in **Figure 1(b).** Set P1=800 kN and P2=400 kN.

*Kirakan daya di dalam setiap kekuda dan nyatakan sama ada daya itu mampatan atau regangan seperti **Rajah 1(b)**. Setkan P1 = 800 kN   dan P2 = 400 kN.*
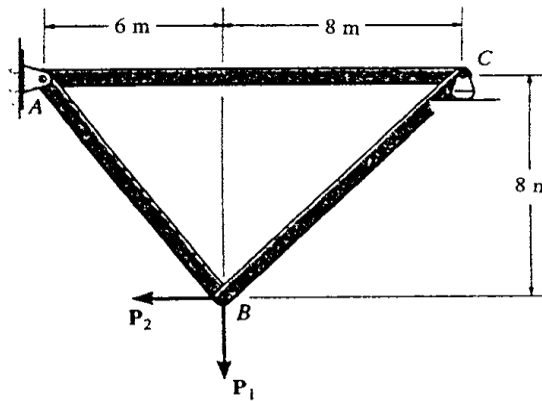
[10 marks]
[10 *markah*]

Figure 1 (b) / *Rajah 1 (b)*

QUESTION 2
SOALAN 2

(a) A helicopter accelerates uniformly upward at 1 m/s^2 to the height of 300 m. By the time it reaches 350 m, it has decelerated to zero vertical velocity. It then accelerates horizontally at 4 m/s^2 to velocity of 15 m/s. Calculate the total time required for this sequence.

Sebuah helicopter memecut dengan seragam secara menegak ke atas 1 m/s^2 hingga ketinggian 300 m. Ia menyahpecutan sehingga halaju menegak bersamaan kosong pada ketinggian 350 m. Ia kemudian memecut secara mendatar dengan 4 m/s^2 kepada halaju 15 m/s. Kirakan jumlah masa keseluruhan yang diperlukan untuk urutan ini.

[15 marks]
[*15 markah*]

(b) The 50 kg crate in **Figure 2(b)** below rests on a horizontal surface for which the coefficient of kinetic friction is $\mu_k = 0.3$. If the crate is subjected to a 400 N towing force as shown, calculate the acceleration of the crate.

*Sebuah kotak berjisim 50 kg seperti **Rajah 2(b)** berada dalam keadaan rehat di atas permukaan rata dengan pekali geseran kinetic ialah $\mu_k = 0.3$. Jika kotak dikenakan daya 400 N, kirakan pecutan, a, kotak tersebut.*
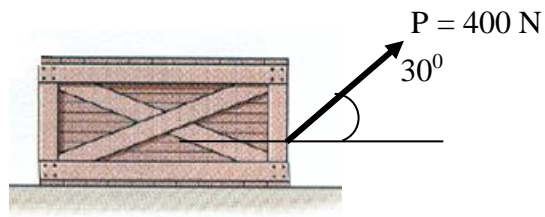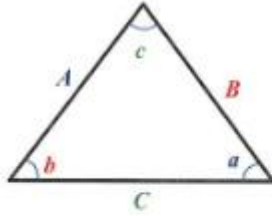
[10 marks]
[*10 markah*]

CLO2
C3

CLO2
C3

Figure 2 (b) / *Rajah 2 (b)*

SOALAN TAMAT

LIST OF FORMULA

STATICS

1. TRIANGLE RULE

Sine law:

$$\frac{A}{\sin a} = \frac{B}{\sin b} = \frac{C}{\sin c}$$

Cosine law:

$$C = \sqrt{A^2 + B^2 - 2AB \cos c}$$

2. ADDITION OF SYSTEM OF COPLANAR FORCE

$$(\overset{+}{\rightarrow}) \ \Sigma F_x = F_{1x} + F_{2x} - F_{3x}$$

$$(+\uparrow) \ \Sigma F_y = F_{1y} - F_{2y} + F_{3y}$$

$$F_R = \sqrt{(\Sigma F_x)^2 + (\Sigma F_y)^2}$$

$$\theta = \tan^{-1}\left|\frac{\Sigma F_y}{\Sigma F_x}\right|$$

3. CARTESIAN VECTOR

$$A = A_x i + A_y j + A_z k$$

$$u_A = \frac{A}{A} = \frac{A_x}{A}i + \frac{A_y}{A}j + \frac{A_z}{A}k$$

$$cos^2\alpha + cos^2\beta + cos^2\gamma = 1$$

$$F_R = \Sigma F = \Sigma F_x i + \Sigma F_y j + \Sigma F_z k$$

$$r = (x_B - x_A)i + (y_B - y_A)j + (z_B - z_A)k$$

$$F = Fu = F\frac{r}{r}$$

4. EQUILIBRIUM OF PARTICLE

$$\Sigma F = 0$$

$$F = ks$$

DYNAMICS

1. RECTILINEAR MOTION OF PARTICLES

$$v = ds/dt$$

$$a = dv/dt$$

2. UNIFORM RECTILINEAR MOTION

- a constant

$$v = u + at$$

$$v^2 = u^2 + 2as$$

$$s = ut + \frac{1}{2}at^2$$

$$s = \frac{1}{2}(v + u)t$$

$$v = r\omega$$

$$a = r\alpha$$

3. WORK OF FORCE

$$U_{1\to 2} = (F \cos \alpha)\Delta x$$

4. KINETIC ENERGY OF PARTICLE

$$KE = \frac{1}{2}mv^2$$

$$U_{1\to 2} = T_2 - T_1$$

5. POTENTIAL ENERGY

$$PE = mgh$$