Menoufiya University Faculty of Engineering Shebin El- Kom Final Second Term Examination Academic Year: 2012-2013 Date: 1 / 6 / 2013	Minufiya University	Dept.: Production Engineering Year : Third Subject: Materials Handling & Systems Design Code : PRE 325 Time Allowed: 3 hours Total Marks: 120 Marks

Allowed Tables and Charts: None.
-The exam measures ILOs No.: a3-1, a16-1, a16-2, b12-1, b13-1,c5-1 and c6-1.

ـ الأسئلة فى صفحتين

- Answer all and assume any required data.

Question No. (1): (30 Marks)

A- Compare between the two materials handling systems shown in Fig (1).
  - Find h of each movable pulley and H if S = 2 m.

B- Figure (2) shows a fixed pulley system in which the pulley factor of resistance (ε) is 1.05.
  - Find and prove that the efficiency:

$$\eta = \{1 / n_p \, \varepsilon^n\} \{(\varepsilon^n - 1) / (\varepsilon - 1)\}$$

Where:

  n_p = number of pulleys,
  n = number of parts of flexible rope.

- Calculate the applied effort and if the moving distance and velocity of the applied load are 20m and 60 m / h, respectively, determine the lifted distance and velocity of a load Q = 3 tons.
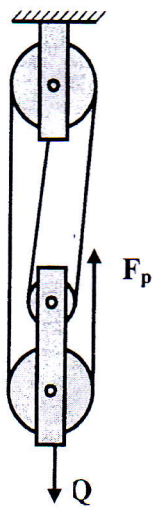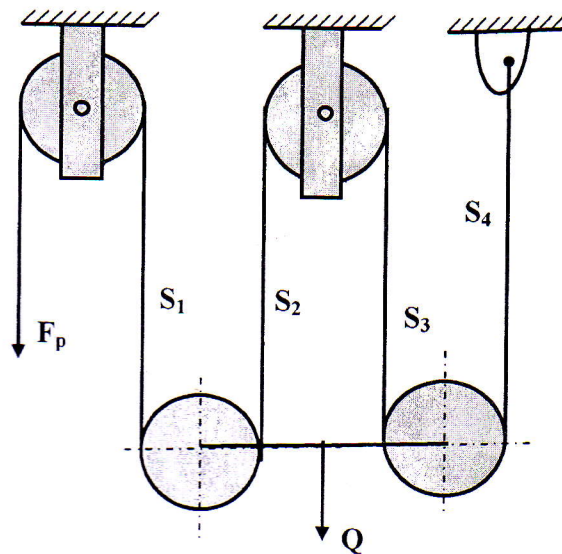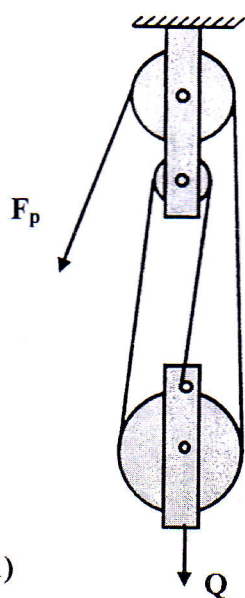

Fig (1)

Fig (2)

(P.T.O)

Question No. (2):   (35 Marks)
A- Discuss the dynamic stability of travelling-hoisting system shown in Fig (2).

B- A fork-lift truck shown in Fig (2), if: $x'' = 3.6$ km / h^2, $y_q'' = 360$ m / min^2, $b = 4$ m, $h_q = 3$ m, $h_m = 2$ m and $\theta = 10°$.

i- Illustrate all forces acting on the system.

ii- Compute Q without undesirable phenomenon and reaction force at joint C.

iii- Draw flow-chart to illustrate avoiding the undesirable phenomenon.

Fig (2)
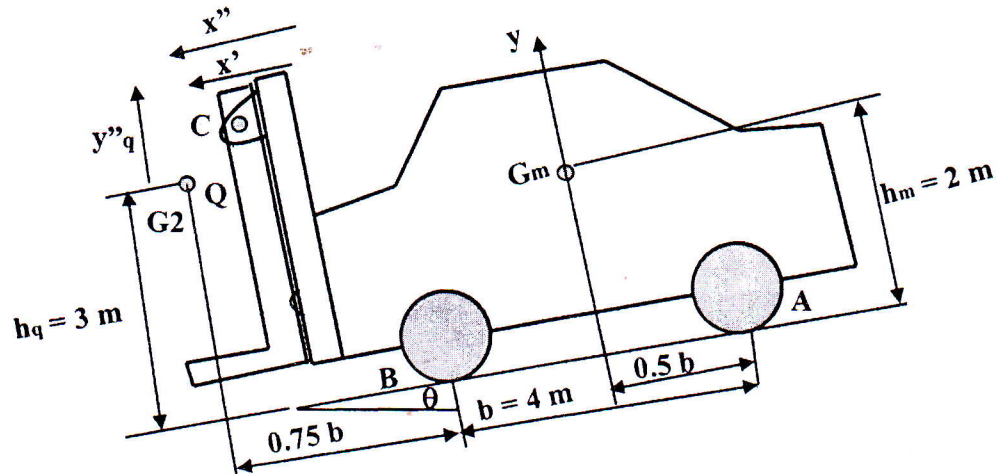
Question No. (3):   (35 Marks)
A- What are the conveying stages by an oscillating trough?

B-1: A belt conveyer Fig (3) has the following data: $r_1 = 0.5$ $r_2 = 0.75$ m, $\theta_o = 5°$, $C = 4$ r_2, $W_m = 15$ kg_f.

Compute: Q_h and L of the belt.

B-2: If such conveyer is operated by C-C planar mechanism, design this mechanism and determine the conveying stages of a particle on the belt at θ_2 and ω_2 (uniform) of this mechanism are $30°$ and 5 rad / min respectively.
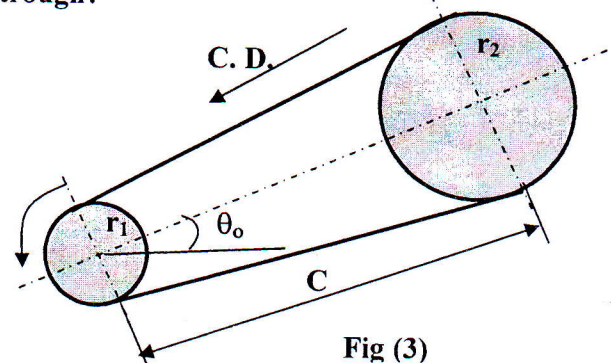
Fig (3)

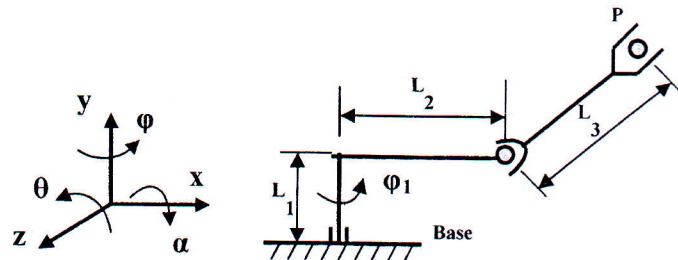## Question No. (4):   (20 Marks)
A- Describe the robot configuration types.

B- Data: A manipulator Fig (4),
$L_1 = 0.5$ $L_2 = 0.75$ $L_3 = 3$ m.

Compute: N_f and determine end-effector positions "P" at:

i - $\varphi_1 = 30°$ and others are zeros.

ii- $\theta = 30°$ and others are zeros.

Fig (4)