Fayoum University
Faculty of Engineering
Preparatory Year

Engineering Statics
Final Exam 2015 / 2016
Time: 3 hours.

ملاحظات هامة جداً:

١- قم بترقيم صفحات كراسة الإجابة من اليمين وابدأ الترقيم من الصفحة الأولى بالكراسة.

٢- أجب عن السؤال الأول في الصفحات (١ و ٢ و ٣) والثاني في الصفحتين (٤ و ٥) والثالث في الصفحتين (٦ و ٧) والرابع في الصفحتين (٨ و ٩) والخامس بدءً من الصفحة (١٠) وحتى تنتهي إجابته.

٣- اكتب الخطوات بوضوح مع وضع النتيجة النهائية وأي نتائج هامة تحصل عليها داخل مستطيل واضح لأن ذلك هام جداً في تقدير الدرجة.

٤- توزيع الدرجات: السؤال الأول (١٢) درجة والثاني (١٠) درجات والثالث (١٠) درجات والرابع (١٠) درجات والخامس (١٨) درجة.

٥- استخدم قيمة عجلة الجاذبية $g=9.8\ m/s^2$.

Answer the following questions:

[1] In Fig. (1), $F_1 = 5.0\,N$, $F_2 = 10.0\,N$, $F_3 = 25.0\,N$, $F_4 = 5\sqrt{34}\,N$. The free couple G_1= 20.0 N.M acts on the face ABDE as shown:

(a) find the magnitude and direction of the resultant of the system.
(b) find the vector expression of the couple (G_1).
(c) find the moment of the system about (D) and hence, find the moment of the system about (O).
(d) show that the system equivalent to a single force and find the equation of its line of action.
(e) what should be added to the system at (E) for equilibrium?

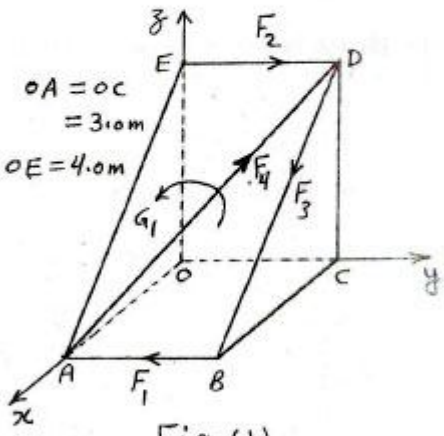

Fig.(1)

[2] If the resultant couple of the system shown in Fig. (2) equals zero, find the values of (F_1) and (F_2).

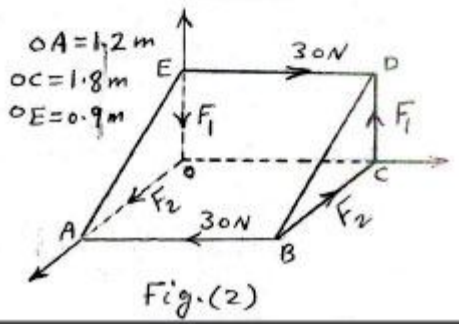

Fig.(2)

[3] In Fig. (3), the uniform beam (BCD) of mass 400 kg is kept in equilibrium using the cable and the support at (B) as shown. The smooth light pulley rotates about a fixed axis at (A). Find:

(a) the magnitude and direction of the reaction at (A).
(b) the tension in the cable.
(c) the magnitude and direction of the reaction at (B).

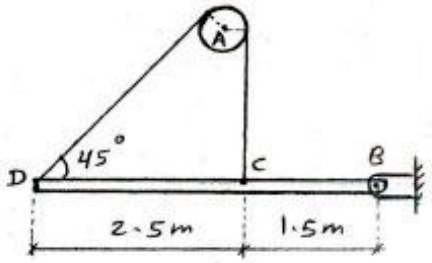

Fig. (3)

[4] In Fig. (4), the light rod (OABC) is kept in horizontal position using a spherical hinge at (O) and the two cables (AE) and (BD) as shown. Find the tension in the two cables.

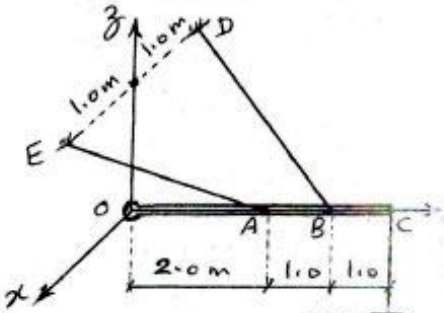

Fig. (4)

[5] The lamina shown in Fig. (5) has a density of 2.0 kg/m^2. A particle m_0=1.5 kg is located at point (A) as shown. Find:

(a) the coordinates $(\bar{x},\bar{y})$ of the center of mass.
(b) the moment of inertia (I_{xx}).
(c) the moment of inertia (I_{yy}).
(d) the polar moment of inertia (I_o).

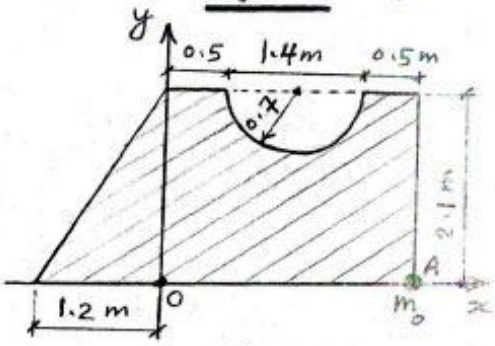

Fig. (5)

Best Wishes

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