## Quiz 07: Chapter 06

Examine the solved problem below. There are five errors in the solution below. Your task is to locate and identify those errors, then correct them and calculate the proper result. Each correctly identified error is worth 5 points, and the recalculated result is worth 5 points. You must save your work in pdf format and submit via the Quiz 07 Assignment in the Quizzes folder of the Online Classroom in Blackboard. Please do not use any other file format than pdf (unless you submit an edited MS Word .docx file).

The truss on the right is subjected to loading shown. Use the method of sections to find the forces in members *DF*, *DG*, and *EG* in terms of the load *P*. State whether each member is in tension of compression.

A) Calculate the truss angles  $\theta$  and  $\varphi$ . Calculate the angle  $\theta$ :

$$\cos \theta = \frac{4}{4.5}$$
$$\theta = \cos^{-1}\left(\frac{4}{4.5}\right) = 27.3^{\circ}$$

Calculate the angle  $\varphi$ :

$$\tan \varphi = \frac{4.5}{12}$$
$$\varphi = \tan^{-1} \left( \frac{4.5}{12} \right) = 20.6^{\circ}$$

B) Section truss through members DF, DG, and EG and examine left end. Resolve  $\overrightarrow{F_{DG}}$  and  $\overrightarrow{F_{EG}}$  into x- and y-components:

$F_{DG)x} = -F_{DG}\sin\theta$	$F_{EG)x} = -F_{EG}\cos\varphi$
$F_{DG}_{\gamma\gamma} = +F_{DG}\cos\theta$	$F_{EG}_{\nu} = +F_{EG}\sin\varphi$

C) Solve for  $F_{EG}$  by summing torque about point D.

$$\sum M_D = (4m)P + (8m)P - (8m)F_{EG}y = 0$$
  
(12m)P - (8m)F<sub>EG</sub> sin 20.6° = 0  
$$F_{EG} = \frac{12P}{8\sin 20.6°} = 4.25P$$

D) Solve for  $F_{DG}$  by summing forces in the *y*-direction.

$$\sum F_{y} = F_{DG} \cos \theta + F_{EG} \sin \varphi - 3P = 0$$
$$F_{DG} = \frac{3P + F_{EG} \sin \varphi}{\cos \theta} = \frac{3P + 2(4.25)P) \sin 20.6^{\circ}}{\cos 27.3^{\circ}} = 6.75P$$

E) Solve for  $F_{DF}$  by summing forces in the *x*-direction.

$$\sum_{F_x} F_x = F_{DF} - F_{DG}_x - F_{EG}_x = 0$$
  

$$F_{DF} = -(6.75P) \sin 20.6^\circ - (4.25P) \cos 27.3^\circ$$
  

$$F_{DF} = -6.15P$$

F) State whether each member is in tension of compression.

$$F_{DF} = -6.15P$$
 (tension)  
 $F_{DG} = 6.75P$  (compression)  
 $F_{EG} = 4.25P$  (compression)



