

College of Engineering, Pune

End Semester Exam – May 2012

SY. B.Tech. (Civil)

(CE 210) – Structural Mechanics-I

Date:- 14 May 2012
Maximum Marks: 50

Time: - 9 am to 12 noon
Duration : - 3 hrs.

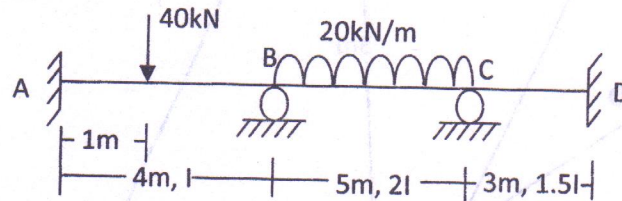
Instructions:

1. All questions are compulsory.
2. Marks of each question are indicated against it.
3. No negative marking.
4. Assume suitable data wherever applicable and mention it clearly.
5. Use of mobile phones is strictly prohibited in the exam hall.

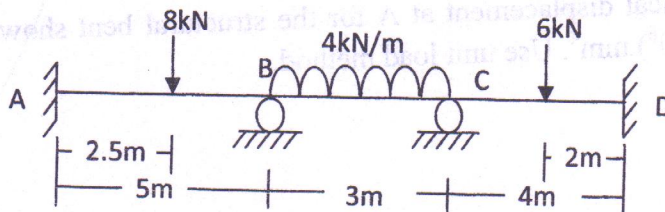
Q.1 a) Derive an expression for the fixed end moments developed at the ends of a fixed beam when the right hand support settles down by Δ . (04)

b) Derive an expression for the strain energy stored in the structure due to bending moment. (04)

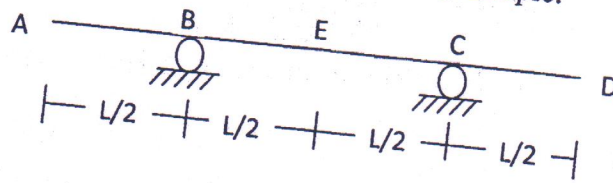
Q.2 Draw the bending moment diagram for the continuous beam $ABCD$ loaded as shown in the fig. below. The relative moment of inertia of each span of the beam is also shown in the figure. Use moment distribution method. (07)



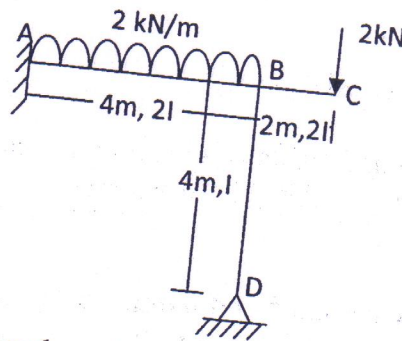
Q.3 Draw the bending moment diagram for the continuous beam $ABCD$ loaded as shown in the fig. below if support B sinks down by 30 mm and support C sinks down by 20 mm. Take $I = 38.2 \times 10^5 \text{ mm}^4$ and $E = 2 \times 10^5 \text{ MPa}$. Use slope deflection method. (07)



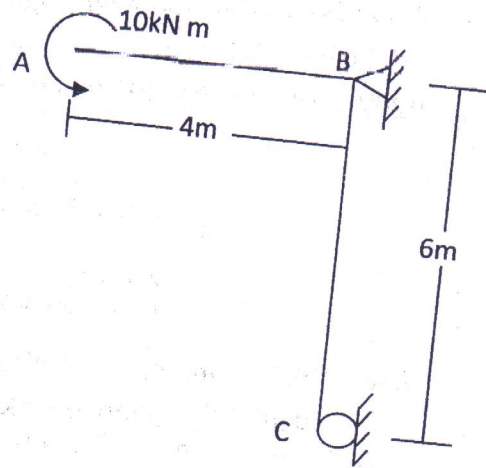
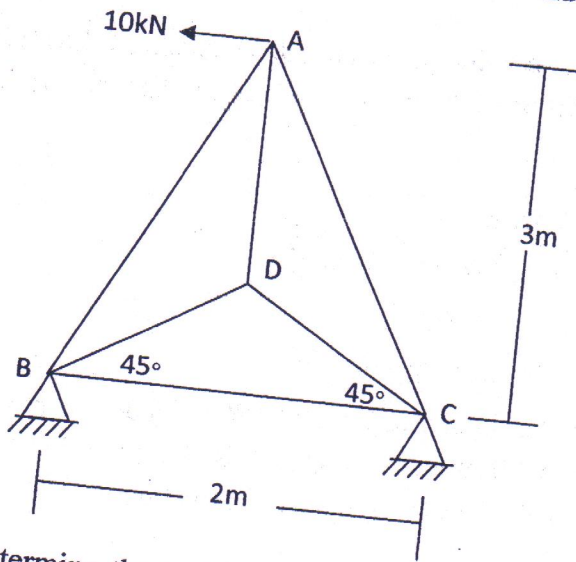
Q.4 Draw influence line diagram for reactions at all the supports and moment and shear at left of point B and at point E by using Muller Breslau's principle. (07)



Q.5 Analyse the rigid frame by Castigliano's theorem. (07)



Q.6 In the following truss, members AB, BC and CA have area of cross section $2a$ and the members DA, DB and DC have area of cross section a . Find forces in all the members of the truss by taking member DA as redundant. (07)



Q.7 Determine the vertical displacement at A for the structural bent shown above. Take $E = 200\text{GPa}$, $I = 90 (10^6) \text{mm}^4$. Use unit load method. (07)