

**B.TECH SEM – IV (2007 COURSE) (CIVIL ENGG.) :**  
**WINTER - 2017**

**SUBJECT : STRUCTURAL MECHANICS - I**

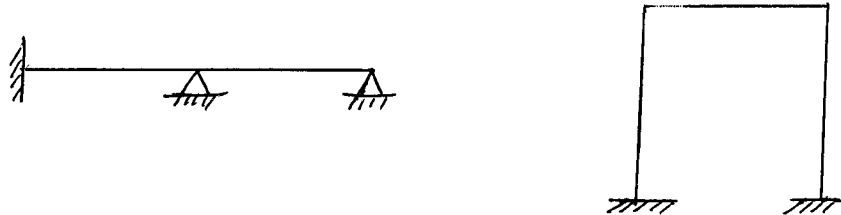
Day : **Thursday** Time : **02.30 PM TO 05.30 PM**  
 Date : **23/11/2017** **W-2017-2403** Max. Marks : **80**

**N. B. :**

- 1) **Q. No. 1 and Q. No.5 are COMPULSORY.** Out of remaining attempt **Any TWO** questions from each sections..
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in the **SEPARATE** answer books.
- 4) Use of non programmable **CALCULATOR** is allowed.

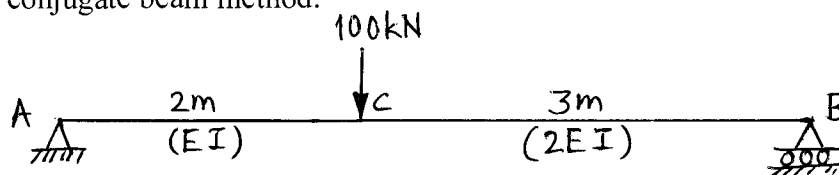
**SECTION - I**

- Q.1 a)** Explain degree of kinematic indeterminacy for beams, frames and trusses. **(04)**
- b)** Draw deflected shape for following structures. **(04)**

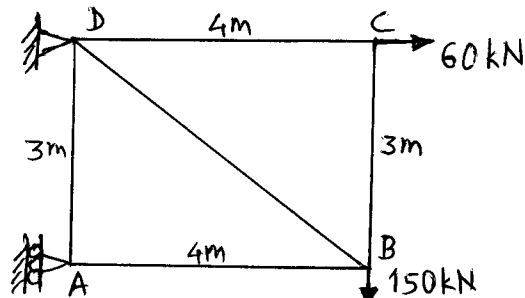


- c)** Explain Castigliano's second theorem and its application. **(04)**

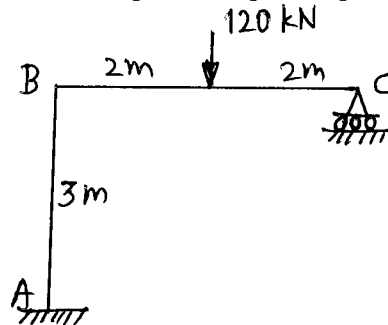
- Q.2** Calculate slope at 'A' and deflection at 'C' for the beam shown in figure using conjugate beam method. **(14)**



- Q.3** Calculate vertical deflection of joint 'B' of the truss shown in figure. **(14)**  
 Take c/s area = 150mm<sup>2</sup> and E = 200GPa for all members.



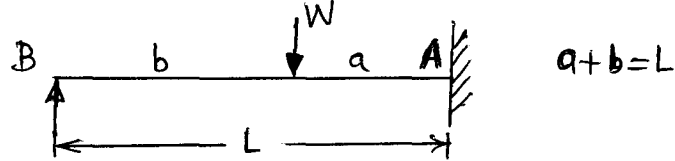
- Q.4** Analyse the frame shown in figure using Castigliano's second theorem. **(14)**



**P.T.O.**

**SECTION - II**

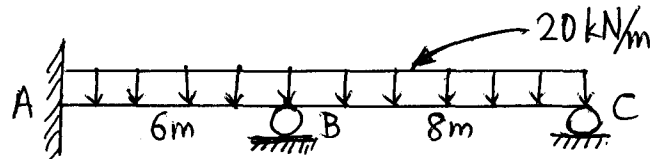
**Q.5 a)** Analyze propped cantilever with a point load as shown. **(04)**



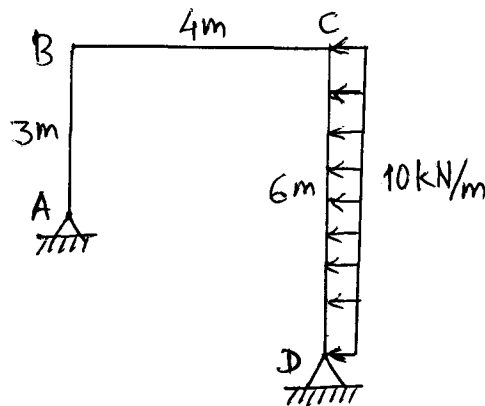
**b)** Describe slope-deflection method for analyzing a fixed or continuous beam. **(04)**

**c)** Explain the terms 'carry over factor' and 'distribution factors' with neat sketch/sketches. **(04)**

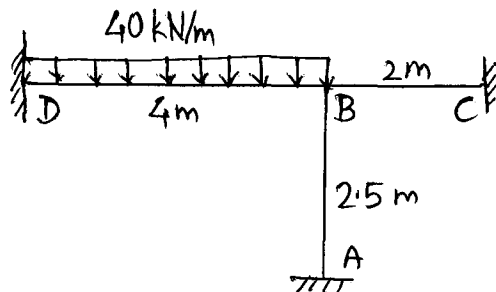
**Q.6** Knowing that 'EI' is constant for the beam AC, draw S.F.D. and B.M.D. using Clapeyron's theorem of three moments. **(14)**



**Q.7** Assuming 'EI' to be constant for the portal frame shown, determine all moments using Slope-deflection method. **(14)**



**Q.8** Determine support moments and draw B.M.D. assuming EI constant. Use moment-distribution method. **(14)**



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