C 22571 (Pages : 4) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2017

Civil Engineering

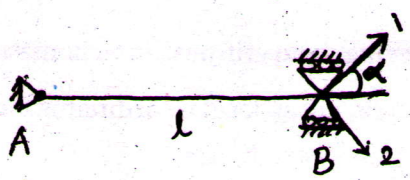
CE 14 604—STRUCTURAL ANALYSIS—III

Time : Three Hours Maximum : 100 Marks

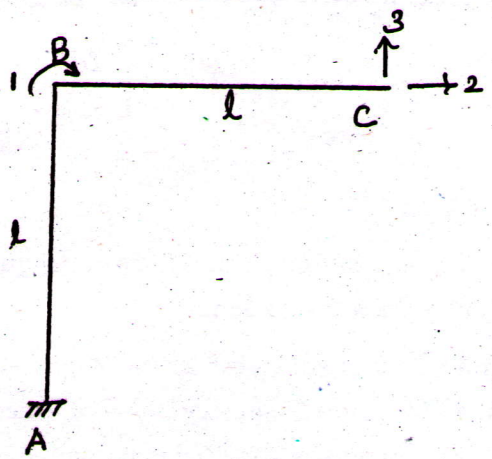
Part A (Short Questions)

Answer any **eight** *questions.*

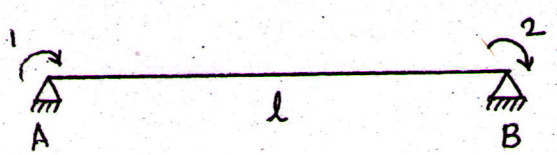
1. Find the Flexibility matrix of a truss member as shown in figure :



2. Develop rotation matrix for the element for the given figure by allowing unit force :

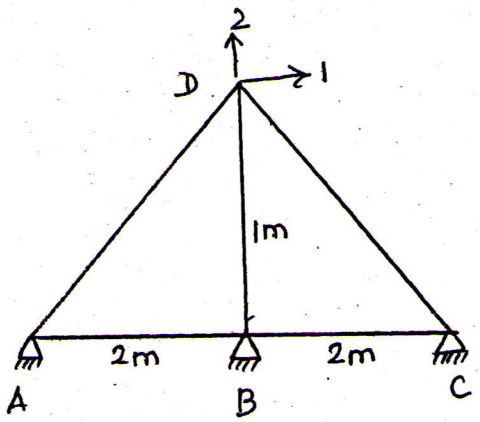


3. Determine stiffness matrix of a beam as shown in figure :



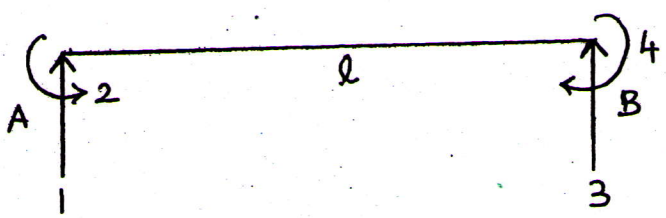
Turn over

4. Construct a transformation matrix by allowing unit displacement for the element as shown in figure :



5. How direct stiffness method is varying from stiffness matrix method ? Brief.

6. Establish the element stiffness matrix in the local co-ordinates for a planar beam element. If axial degree of freedom doesn't exist for the given figure :

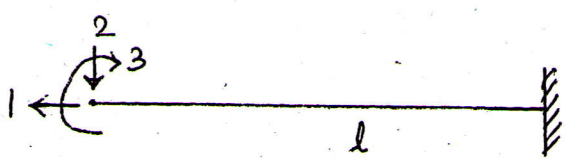


7. Harmonic motion has a maximum velocity of 6m/sec and it has a frequency of 12cps. Determine the amplitude, its period and its maximum acceleration.

8. A 30 kg mass mounted on an isolator whose stiffness is 5 kN/m. Where the system is subjected to a harmonic excitation of a magnitude 200N and frequency of 35 rad/sec and the phase difference between the excitation and steady state response is 30°. Find maximum damping ratio and maximum deflection due to this excitation.

9. Why is it necessary to transform the element stiffness matrix into global co-ordinates ?

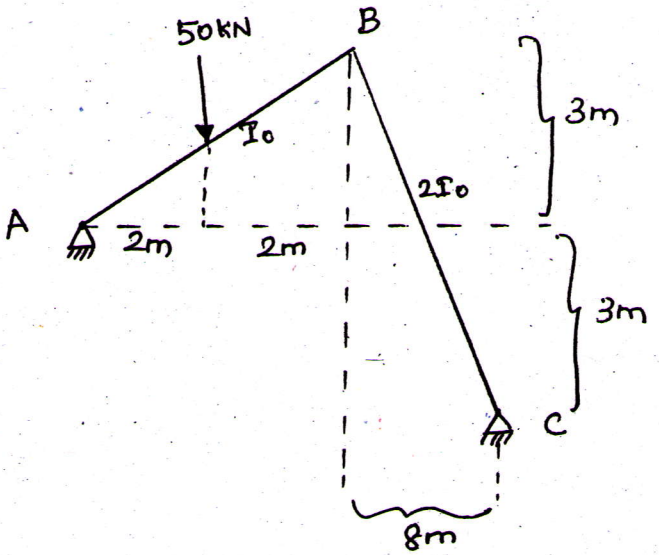
10. Obtain the flexibility matrix for the given figure :



(8 × 5 = 40 marks)

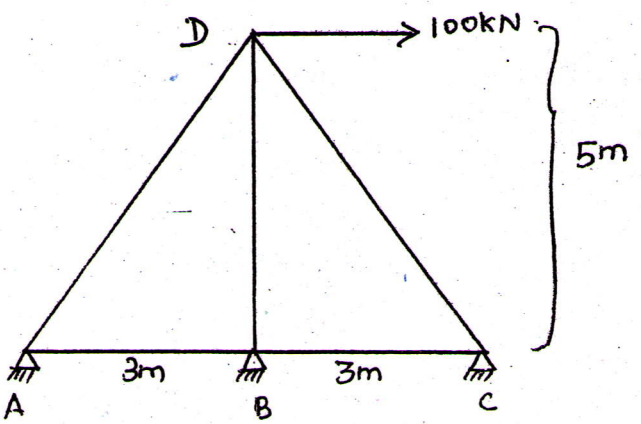
Part B (Descriptive questions)

11. Analyse the given Structure by compatibility method :

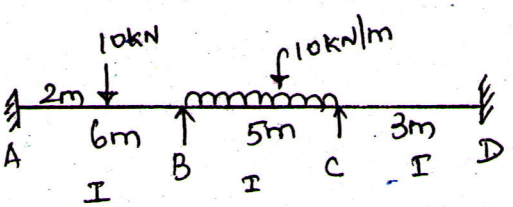


Or

12. Analyse the given truss by force method :

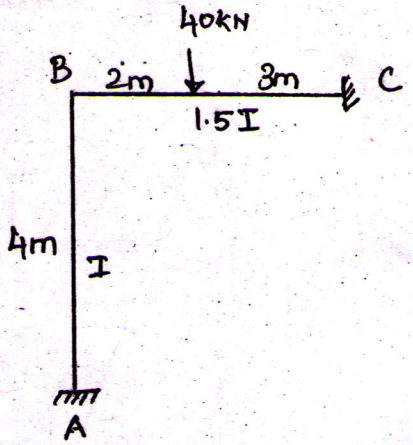


13. Analyse the given element by displacement method. Draw the Bending moment diagram :

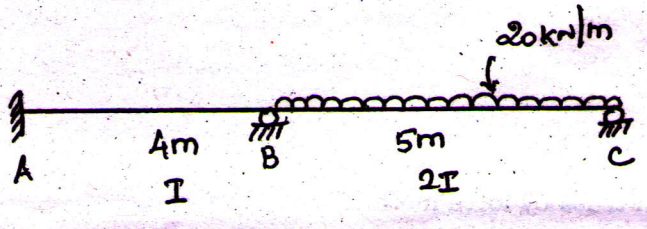


Or

14. Analyse the given frame by equilibrium method :

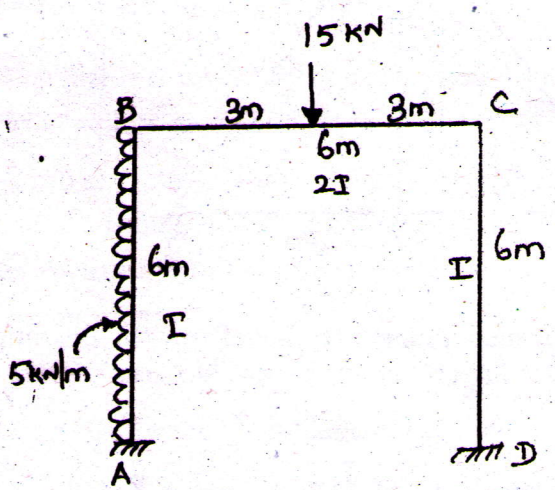


15. Analyse the given element by direct stiffness method. Draw the Bending moment diagram :



Or

16. Analyse the given frame by direct stiffness method :



17. A mass of 1 kg is suspended by a spring having a stiffness of 600 N/m. The mass is displaced downward from its equilibrium position by a distance of 0.01 m. Find equation of motion, natural frequency, response as a function of a time and total energy of the system.

Or

18. Determine the characteristic equation for damped free vibration of a two degree of freedom system.

(4 × 15 = 60 marks)