DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

End Semester Winter Examination – DecWinter 2019

Course: *Civil Engineering*   Sem: V

Subject: *Structural Mechanics II* (*BTCVC502*)   Marks:60

Date: 11/12/2019   Duration: 3 Hr.

Instructions to the Students:
1. Solve **ANY FIVE** questions out of the following.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.
5. *Solve All Questions in **Sequential** order.*

	(Level/CO)	Marks

Q. 1 Solve the following.   CO 3   12

A) The Frame ABCDEF shown in Figure 1 has a regular hexagon shape and is subjected to 60 kN vertical downward loads at A and D. All the members are of the same material and have the same cross-sectional area. Determine the forces in all the members.   **06**
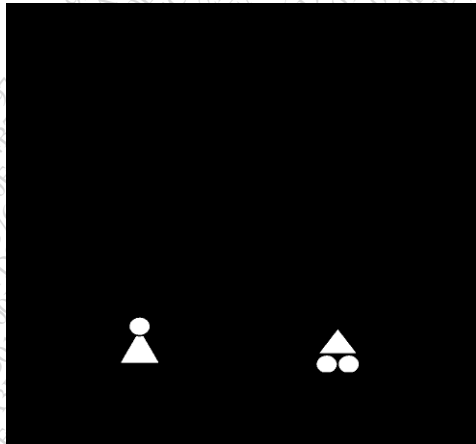

Figure -1

B) Find the forces in all the members of the truss shown in Figure 2.The cross sectional area and Young's Modulus of all the members are the same.   **06**
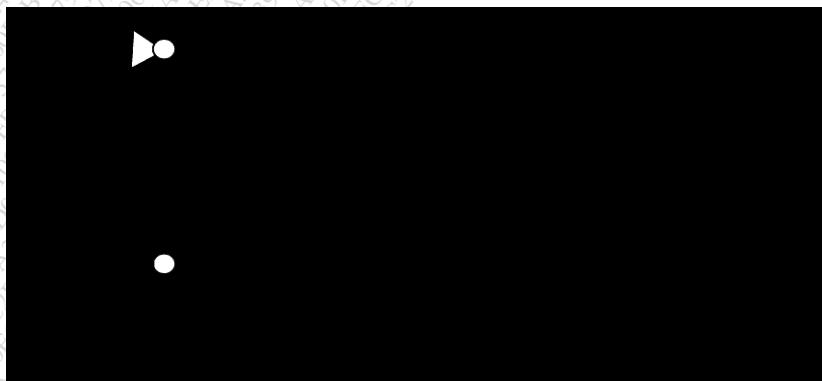

Figure -2

Q.2 **Solve the following.**   CO 3   12

A) A train of 5 wheel loads as shown in Figure 3 crosses a simply supported beam of span 24 m from left to right. Calculate the maximum positive and negative shear force values at the centre of span and absolute maximum bending moment anywhere in the span.   06
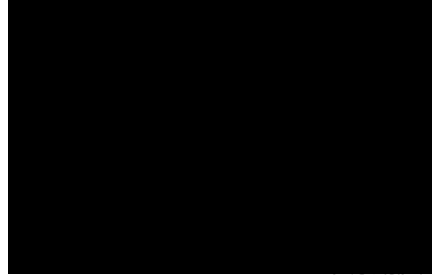

Figure 3

B) Draw the influence line diagram for the forces in the members L_0U_1, U_1U_2, U_2U_3, L_0L_1, L_1L_2, L_2L_3, U_1L_1, U_2L_2, U_3L_3, U_1L_2 & U_2L_3, of the Through type symmetric truss as shown in figure4.Determine maximum forces in these members when unit load traverses the span of 48 m.   06
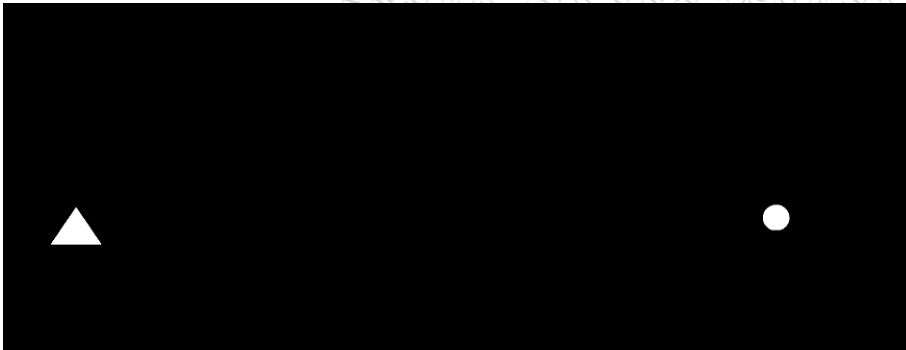

Figure 4

Q. 3 **Solve the following.**   CO 1   12

A) A Three Hinged parabolic arch has a span of 30m and a central rise of 6m.Five wheel loads of 4kN, 5kN, 5kN, 3kN, 3kN spaced at 3m, 2m, 3m and 2m in order, cross the arch from left to right with the 4kN load leading. When the leading load is 20m from the left Hinge, calculate horizontal thrust in the arch. Also calculate the bending moment, normal thrust and shear force at section under tail load.   06

B) A Suspension Cable of 75 m horizontal Span and central dip 6m has a stiffening girder hinged at both ends. The dead load transmitted to the cable including its own weight is 1500kN.The girder carries a live load of 30kN/m uniformly distributed over the left half of the span. Assuming the girder to be rigid, calculate the SF & BM in the girder at 20m from the left support. Also Calculate the maximum tension in the cable.   06

Q.4 **Solve the following.** CO 1 12

A) A Fixed Beam ABC is Clamped at A & C subjected to UDL of 30 kN/m over entire
span. Span of fixed beam ABC is 6 m. Flexural rigidities of AB and BC parts are EI and 12
2EI respectively. AB=3m, BC=3m. Determine the reactions & Moments at supports
& Finally draw SFD and BMD. Use the flexibility method of structural analysis.

Q. 5 **Solve the following.** CO 1 12

A) Define Stiffness & write the procedure/steps to be adopted to solve any problem
by using stiffness/displacement method of analysis. 06

B) Analyse the Continuous beam ABC having support A as Fixed and other are
rollers as shown in figure 5.Assume that supports are unyielding. EI is constant
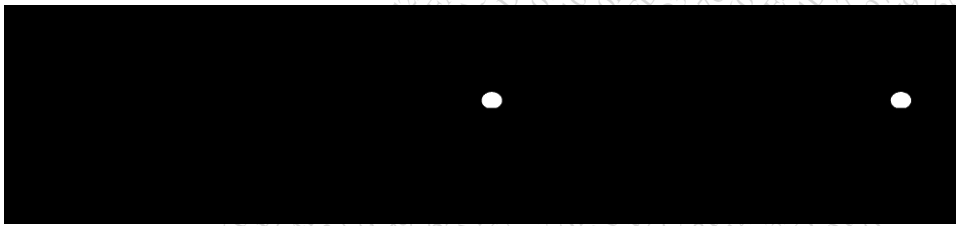for all members. Use Stiffness method for analysis. 06

Figure 5

Q. 6 **Solve the following.** CO 2 12

A) Write & explain the procedure/steps to be adopted to solve any problem of
structural analysis using Finite Element method. 06

B) Enlist, Explain and sketch the different types of Finite Elements. Also Explain
guidelines for Discretisation. 06

*** End of the paper ***