

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2015

Paper Code: ETCE-303

Subject: Advance Structural Analysis

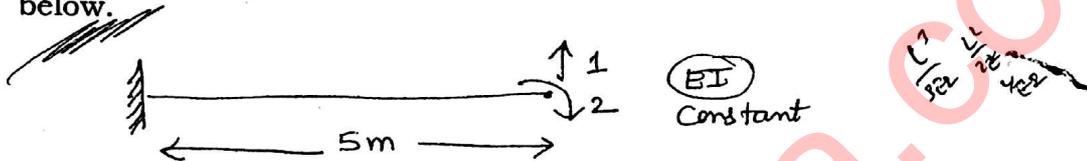
Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory.

Q1 Attempt any five questions: (5x5=25)

- (a) What is an arch? Define on the basis of material, section, shapes etc.
- (b) What is Horizontal thrust in an arch? Find horizontal thrust in a circular arch of length $2R$ and loading w/m on its complete span.
- (c) What are curved beams? How they are different from arches?
- (d) Differentiate between stiffness and flexibility of an structural member.
- (e) Derive flexibility matrix of a cantilever w.r.t to shown coordinates below.



- (f) Derive formula for static indeterminacy for a space truss with all assumptions.
- (g) What is principle of virtual work?

Q2 (a) For arches with springing at different level prove that: (5)

$$\frac{l'}{l} = \sqrt{\frac{y'_c}{y_c}}$$

where l & l' are lengths of spans at different springing level's and y'_c & y_c are crown heights.

- (b) A three hinged circular arch of span 16 m and rise 4 m is subjected to two point loads 100 kN & 80 kN at left and right quarter span points respectively. Find reactions at supports and BM, Radial shear and Normal thrust at 6 m from left support. (7.5)

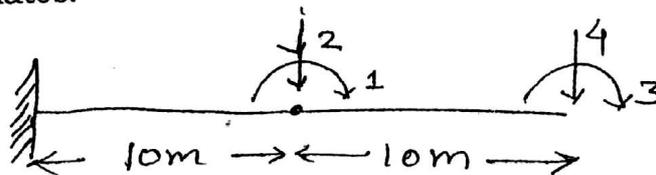
Q3 (a) What is 2 hinged parabolic arch? Derive its horizontal thrust equation. (6)

$$H = \frac{\int_0^l \mu y dx}{\int_0^l y^2 dx}$$

where μ is beam moment.

- (b) Derive flexibility matrix of a cantilever having 3 degree of freedom at free end. (6.5)

Q4 Develop flexibility and stiffness matrix of following beam w.r.t to shown coordinates. (12.5)



show that $[K] [f] = [I]$.

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P.T.O.