

B.E DEGREE EXAMINATIONS: APRIL/MAY 2014

(Regulation 2009)

Fifth Semester

CIVIL ENGINEERING

CEE113: Structural Analysis I

Time: Three Hours**Maximum Marks: 100****Answer all the Questions:-****PART A (10 x 1 = 10 Marks)**

- For a simply supported beam carrying a UDL w/m over the whole span, the central deflection is
 - $wl^3/48EI$
 - $wl^3/24EI$
 - $5wl^4/384EI$
 - $wl^2/8$
- The work done by the first set of forces which are acting through the displacement caused by the second set of forces is equal to the work done by the second set of forces which are acting through the displacement caused by the first set of forces is
 - Muller breuslouis principle
 - Maxwell's reciprocal theory
 - Strain energy theorem
 - Unit load method
- ILD for SF has ordinates
 - $(l-x/l), x/l$
 - $(x-l/l)$
 - l/x
 - a/b
- ILD for bending moment has maximum ordinates of
 - $(l-x/l).x$
 - $(y/l).x$
 - $l.x/y$
 - $(l-y)/y$
- The bending moment at any section of an arch is equal to the vertical intercept between the linear arch and the centre line of the actual arch is
 - Reciprocal theorem
 - Maxwell theorem
 - Eddy's theorem
 - Principle of least work.
- Statically determinate arch is
 - Two hinged arch
 - Fixed arch
 - Three hinged arch
 - One hinged arch.
- The statically indeterminate beam or frame is analyzed by the method of consistent deformation by first obtain a _____
 - Basic determinate structure
 - Free body diagram
 - Fixed moment
 - Support reaction

- In slope deflection method the settlement of supports is included as
 - $\pm 6EI\delta/l^2$
 - $\pm 3EI\delta/l^2$
 - $\pm 6EI/\delta l^2$
 - $\pm 6EI/\delta$
- Ratio of stiffness of member to total stiffness of all the members meeting at that joint
 - Relative stiffness
 - Carry over factor
 - Sway factor
 - Distribution factor
- Force required to produce unit deflection is
 - Stiffness
 - Flexibility
 - Relative stiffness
 - Sway.

PART B (10 x 2 = 20 Marks)

- State Castigliano's second theorem.
- List out the methods of computing the joint deflection of a perfect frame.
- List out the types of rolling loads.
- Define influence line diagram.
- What are the different types of forces acting on any sections of arch?
- Why there is no effect of temperature in a three hinged arch?
- Write the general procedure to solve a continuous beam using slope deflection method.
- List out the reasons for sway in a portal frame.
- Mention the fundamental proposition used in the moment distribution method.
- Write the advantage of moment distribution method.

PART C (5 x 14 = 70 Marks)

- Calculate the central deflection and the slope at ends of a simply supported beam carrying a udl of w/m length over the whole span.

(OR)

 - Determine the vertical and horizontal displacement of the point C of the pin-jointed frame shown in Fig (1). The cross-sectional area of AB is 100 sq.mm and of AC & BC 150 sq.mm each. $E=2 \times 10^5 \text{N/mm}^2$.
- A series of loads as shown in Fig (2) crosses a beam of 17m. Find the maximum positive and negative shear force at a section 5m from the left support. Also find the maximum bending moment under a load of 10 kN and 18 kN.

(OR)

 - Draw the ILD for reaction at the prop. of a propped cantilever of 9m length.

Draw the ordinates at 1.5m interval.

23. a) A symmetrical parabolic arch with a central hinge of rise 'r' and span L is supported at its ends on pins at the same level. What is the value of horizontal thrust when a load W which is uniformly distributed horizontally covers the whole span? Also show that there is no bending moment at any point in the arch rib.

(OR)

- b) A parabolic arch, hinged at supports has a span 30m and rise 5m. A concentrated load of 12kN acts at 10m from the left hinge. Calculate the horizontal thrust and the reaction at the hinges.

24. a) A beam AB of span 4m is fixed at A and B and carries a point load of 5kN at a distance of 1m from end A. Calculate the support moments by the method of consistent deformation.

(OR)

- b) A continuous beam ABCD, 12m long is fixed at A & D, and is loaded as shown in Fig(3). Analyze the beam completely if the following movements taken place simultaneously.

i) The end A yields, turning through $1/250$ radians in a clockwise direction

ii) End B sinks 30mm and End C sinks 20mm in downward direction.

$$I = 38.20 \times 10^5 \text{ mm}^4$$

$$E = 2 \times 10^5 \text{ N/mm}^2.$$

25. a) A continuous beam ABCD consists of 3 spans and is loaded as shown in Fig (4). End A & D is simply supported. Determine the bending moments at the supports and plot the BMD. Use moment distribution method.

(OR)

- b) A continuous beam ABC is supported on an elastic column BD and is loaded as shown in Fig (5). Analyze the frame and plot the BMD using moment distribution method.
