Registration No : | | | | | | | | | | |

Total Number of Pages : 03 **B.Tech.**
PCI4I001

4th Semester Regular / Back Examination 2017-18
STRUCTURAL ANALYSIS - I
BRANCH : CIVIL
Time : 3 Hours
Max Marks : 100
Q.CODE : C891

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1 **Answer the following questions: *multiple type or dash fill up type :*** **(2 x 10)**

a) The number of independent equations to be satisfied for static equilibrium in a space structure is :
i) 2 ii) 3
iii) 4 iv) 6

b) Castgliano's first theorem is applicable only when-----

c) The deflection at any point of a perfect frame can be obtained by applying a unit load at the joint in the direction -------

d) The three moment equation is applicable only when----------

e) Bending moment at any section in conjugate beam gives in the actual beam
i) shaer force ii) slope
iii) deflection iv) bending moment

f) A single rolling load of 10 kN rolls along a girder of 10 m span. The absolute maximum bending moment will be ------.

g) For a single point load P moving on a symmetrical three hinged parabolic arch of span L, the maximum sagging moment will occur at ----- distance from ends.

h) Sinking an intermediate support of a continuous beam reduces ---------.
i) Negative moment at the support
ii) positive moment at the support
iii) Negative moment at the centre of span
iv) Negative moment to zero at the support

i) In the displacement method of analysis, the basic unknowns are
i) displacements and forces ii) forces
iii) displacements iv) none of the above

j) The maximum bending moment due to a train of wheel loads on a simple supported girder
i) always occurs at centre of span
ii) always occurs under a wheel load
iii) never occurs under a wheel load.
iv) none of the above

Q2 **Answer the following questions: *Short answer type :*** **(2 x 10)**

a) Differentiate between force method and displacement method.

b) Explain degree of kinematic indeterminacy with example

c) Write use of influence line diagram.

d) Write theorem of three moments for a two span continuous beam with support settlement.

e) What is the advantage of an arch over a beam?
f) Explain principle of virtual displacement.
g) How normal thrust at a section in a three hinged arch is calculated?
h) Differentiate between cantilever beam and propped cantilever beam.
i) Show a suspension cable with different level?
j) Draw free body diagram of a space truss.

Part – B (Answer any four questions)

Q3 **a)** Calculate support moments using theorem of three moment **(10)**

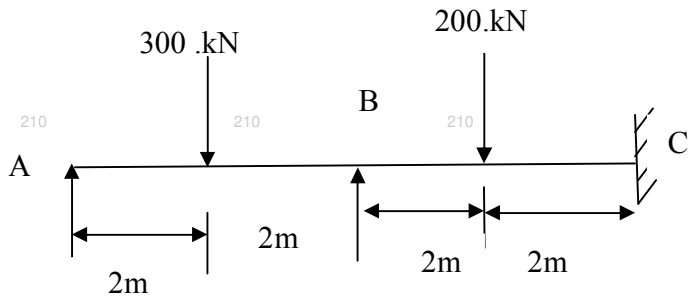


Fig 1

b) A fixed beam of span 12 m is loaded with a uniformly distributed load of 30 kN/m throughout the span in addition to a point load of 60 kN at centre of the span. Calculate fixed end moments and draw SFD and BMD. **(5)**

Q4 **a)** A propped cantilever AB is of span 8m is loaded with an uniformly distributed load of 12 kN/m in left half of the span. End B is fixed. Calculate the reactions. **(10)**

b) A simply supported beam of span 10 m of uniform EI carries a concentrated load of 30kN at 6 m from left support. Calculate the maximum deflection applying moment area method. **(5)**

Q5 **a)** Calculate the horizontal displacement of point C on the rectangular bent shown in Fig 2. Take E=200 kN/mm^2 and I =450x10^7 mm^4 for all members. **(10)**

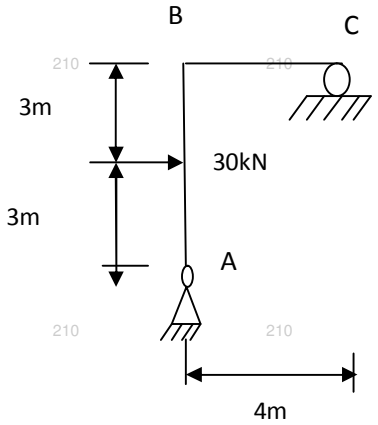
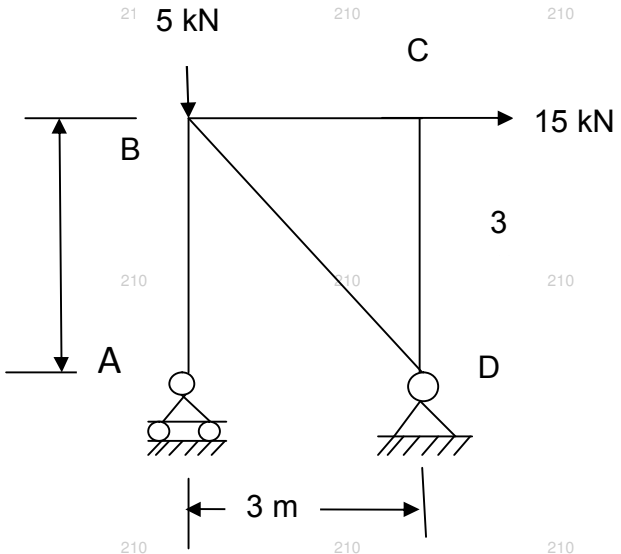


Fig 2

b) Explain compatibility requirements. **(5)**

Q6 **a)** Calculate the vertical deflection of joint C as shown in figure below. Take cross sectional area of each member 1000 mm^2 and E = E=200 kN/mm^2 **(10)**



b) Discuss analysis of externally redundant plane truss. **(5)**

Q7 **a)** Construct the influence line for bending moment and shear force at a section 2.5 m from left support of a simple supported beam of span 6 m. calculate the maximum bending moment and shear force when a UDL of 10 kN/m longer than the span moves across the beam. **(10)**

b) Draw ILD for normal thrust and bending moment at a section of a three hinged arch. **(5)**

Q8 **a)** A three hinged circular arch of horizontal span of 21 m has a central rise of 4 m. It is loaded with a concentrated load of 80 kN at 6m from left end support. Calculate horizontal thrust, two support reactions and bending moment under the load. **(10)**

b) Prove that a uniformly distributed load shorter than span will cause maximum bending moment, when it occupies such a position, that the section divides the load in the same ratio, as it divides the span. **(5)**

Q9 **a)** Calculate tension in the cable supported at different levels. Assume data required. **(10)**

b) . A three hinged parabolic arch of horizontal span of 30 m has a central rise of 5 m. Calculate maximum positive bending moment at a section 10 m from the left hand support when a uniformly distributed load of 60 kN/m rolls over the arch. Also calculate absolute maximum bending moment. **(5)**