Registration no: | | | | | | | | | | |

Total Number of Pages: 01 **M.TECH**

CEPC201

2nd Semester Back Examination 2016-17

ELASTIC STABILITY AND BEHAVIOUR OF METAL STRUCTURES

BRANCH(S): STRUCTURAL & FOUNDATION ENGG, STRUCTURAL ENGG

Time: 3 Hours

Max Marks: 70

Q.CODE:Z484

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** (2 x 10)

a) Differentiate between b*ending* and *buckling*.
b) Plastic neutral axis passes through the centroid of cross section. Comment.
c) What do you mean by an *ideal column*?
d) What do you mean by *critical load*used in case of columns?
e) Define *plastic hinge*.
f) Can *beam-column theory* be used to calculate *critical loads*?
g) In case of neutral equilibrium of a system, there is no change in energy. Comment.
h) What do you mean by *plastification* of a section?
i) Thin walled open cross sections resist bending better than twisting – why?
j) Define *center of twist*.

Q2 a) Show with the help of figures that in case of stable equilibrium, the energy of the system is minimum and in case of unstable equilibrium it is a maximum. (5)

b) Considering a bar fixed at base and free at top under a point load 'Q' acting towards right at top, approximately calculate the critical load by energy method. (5)

Q3 Derive the equation for bending of beam-columns under concentrated lateral load. (10)

Q4 Calculate the plastic moment capacity of a portal frame fixed at the supports, vertical legs are of length 'L' and horizontal beam is of length 'L', carrying load 'W' at center of horizontal beam and load 'W' at middle of the left vertical leg. (10)

Q5 Derive the equation for buckling of a bar on elastic foundation. (10)

Q6 a) Explain specific cases, wherenonuniform torsion occurs in thin walled open cross sections. (5)

b) A continuous two span beam is fixed at the extreme ends. Both spans are having length 'L'. EI is constant throughout. Two concentrated loads of 'W' act at the center of each span vertically downwards. Calculate full plastic moment. (5)

Q7 a) Derive the formula for lateral buckling of a simply supported beam. (10)

Q8 **Write short notes on any two** (5 x 2)

a) Warping rigidity
b) Lateral buckling of frames
c) Reserve strength of material
d) Torsional buckling