Sanjay Ghodawat University, Kolhapur 2018-19
Established as State Private University under Govt. of Maharashtra. Act No XL, 2017 EXM/P/09/01

Year and Program:2018-19 **School of Technology** **Department of Civil Engineering**

Course Code: CET 216 **Course Title: Structural Analysis I** **Semester – IV**

Day and Date: Thursday 30/05/2019 **End Semester Examination (ESE)** **Time:** 3 Hrs. (10.30 am to 1.30 pm.) **Max Marks: 100**

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

			Marks	Bloom's Level	CO
Q.1	a)	At a point in strained material, the principal stresses are 100N/mm^2 tensile and 40N/mm^2 compressive. Determine the normal stress, tangential stress and resultant stress in magnitude and on plane 60° to the axis of the major principal stress.	07	L_4	CO 1
		OR			
	a)	At a certain point strained material AB and BC are two mutually perpendicular planes of an elements, AB being horizontal BC being Vertical plane, The intensity of resultant stress on the plane BC is 10MPa(Tensile) inclined at 30° to the normal to that plane and stress on horizontal plane AB is 6MPa (Tensile) acting to that plane. Determine: i) Principal stress and their directions. ii) Maximum shear stress.	07	L_4	CO 1
	b)	Determine the maximum and minimum stress at the base of a hollow circular chimney of height 20m with external diameter 4m and internal diameter 2m. The chimney is subjected to a horizontal wind pressure of intensities 1KN/m^2. The specific weight of the material of chimney is 22 KN/m^3	08	L_4	CO 2
		OR			
	b)	A masonry dam of rectangular section 20m height and 10m wide has water up to a height of 16m on its one side Determine maximum and minimum stress at the base .Take density of masonry 19.62 KN/m^3 and water 9.81 KN/m^3.	08	L_4	CO 2

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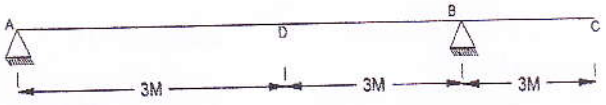
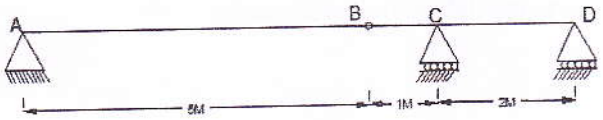
Q.2 a) Draw ILD for S.F and B.M. at a point 3 m from support A, for the beam shown in fig. Support A and B are simple. 07 L_1 CO 3



OR

a) For the compound beam having hinge at B shown in fig., construct the ILD for a) the reaction at A b) the reaction at C 07 L_1 CO 3



b) A simply supported beam of span L is subjected to equal loads W/2 at each of 1/3rd span points. Find the deflection at mid span by using Macaulay's method. 08 L_3 CO 4

OR

b) A cantilever beam of span 4m is subjected to 8 kN at free end. Find the slope and deflection at the free end of a cantilever beam by using moment area method. Take EI= 4000 kN-m^2 08 L_3 CO 4

Q.3 **Solve any Two**

a) **Define** the followings terms 08 L_2 CO 1

i) Principal Plane ii) Principal Stress iii) Angle of obliquity iv) Mohr's circle of stresses.

b) **i) Explain** the concept of combined direct and bending stresses on column. 08 L_2 CO 2

ii) Find the kernel of a rectangular section width b and depth d.

c) i) What is ILD and explain with example. 08 L_2 CO 3

ii) Applications of ILD.

d) i) What is mean by conjugate beam? How it differs from original beam. 08 L_2 CO 4

ii) Explain moment area method.

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Q.4		**Solve any Two**			
	a)	A steel shaft is subjected to a torque of 20KN-m and a bending moment of 10KN-m. The diameter of the shaft is 100mm. Calculate the maximum and minimum principal stresses and also the maximum shear stress in the shaft as its surface.	09	L_3	CO 5
	b)	A solid circular shaft transmits 2250KW at 400 rpm and is also subjected to a bending moment of 30KN-m at a section. Find i) Equivalent bending moment and Equivalent twisting moment. ii) Minimum diameter of the shaft if max. shear stress is limited to 63 N/mm^2	09	L_3	CO 5
	c)	A solid shaft 80mm diameter is transmitting a torque of 3KN-m. At the same time it is subjected to BM of 2 KN-m and axial thrust. If maximum principal stress is limited to 100 N/mm2, determine axial thrust.	09	L_4	CO 5
Q.5		**Solve any Two**			
	a)	A column of timber section 15cm X20cm is 6m long both ends fixed. If young's modulus for timber 17.5KN/mm^2. By using Euler's theory Determine i) Crippling Load ii) Safe load for the column if factor of safety 3.	09	L_4	CO 6
	b)	Determine the buckling load for a strut of T section, the flange width being 100mm, overall depth is 80mm and both flange and web 10mm thick. The strut is 3m long and is hinged at both ends. Take E=200GPa.	09	L_4	CO 6
	c)	A hollow cast iron column whose outside diameter is 200mm and has a thickness 20mm is 4.5m long and is fixed at both ends. Calculate the safe load by Rankines formulae using a factor of safety of 2.5. Take Rankines constant =1/1600 and Ultimate crushing Stress is 550 N/mm^2.	09	L_4	CO 6
Q.6		**Solve any Three**			
	a)	Define 1) Equivalent bending moment, 2) Equivalent torque.	06	L_2	CO 5
	b)	Explain maximum principal stress and maximum shear stress theory of failure	06	L_2	CO 5
	c)	Define the term column, strut, buckling load and safe load.	06	L_2	CO 6
	d)	Explain the limitations of Euler's Theory.	06	L_2	CO 6

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