## MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL A Constituent Institution of Manipal University

## III SEMESTER B.TECH. END SEMESTER MAKE UP EXAMINATIONS DEC 2017

## SUBJECT: MECHANICS OF STRUCTURES [CIE 2102]

Date of Exam: 22 /12/ 2017 Time of Exam: Max. Marks: 50

## Instructions to Candidates:

Answer ALL the questions & missing data may be suitably assumed

r				
1A.	Determine the forces in the members <b>AB</b> , <b>AH</b> , <b>BC</b> , <b>BG</b> & <b>GH</b> of the truss shown in <b>Fig.Q1A</b> . Tabulate the magnitude of the forces indicating their nature.	5	CO1	
1B.	The cross section of a beam is an unsymmetrical <b>I</b> -Section of overall depth <b>240mm</b> . Width of top and bottom flanges are <b>160mm</b> and <b>100mm</b> respectively, thickness of top and bottom flanges are <b>30mm</b> and <b>20mm</b> respectively and web thickness is <b>10mm</b> . Draw the shear stress variation across the depth if it carries a shear force of <b>250kN</b> .	5	CO1	
2A.	From some tests on struts with both ends fixed in position but not against rotation, two of the results obtained are,Test#1Test#1Test#2Slenderness ratio100200Average stress at failure90 MPa50 MPaAssuming these results are in in agreement with Rankine's formula, find the two constants in that formula. What is the value of Young's modulus of the material?	5	CO2	
2B.	The stresses on two perpendicular planes through a point are <b>120MPa</b> tensile and <b>80MPa</b> compressive along with <b>60MPa</b> shear. Determine the normal and shear stress components on a plane at <b>60°</b> to that of <b>120MPa</b> stress. Also calculate the principal stresses and maximum shear stress.	5	CO2	
3A.	Show that a hollow shaft is stronger and stiffer than a solid shaft of same material, length, weight and subjected to same maximum shear stress.	5	CO2	
3B.	Define Influence line diagram.From the first principle draw the influence line diagrams for shear and bending moment at any section "X" from the left support of a simply supported beam(01+02+02)	5	CO3	
4A.	Using Macaulay's method, determine the vertical displacement at mid-point of <b>AB</b> of an overhanging beam shown in <b>Fig.Q4A</b>	5	CO4	
4B.	Determine horizontal and vertical displacement of the free end <b>C</b> of vertical bent shown in <b>Fig. Q4B</b> using unit load method. EI is uniform	5	CO4	
5A.	Determine the slope and deflection at mid span for a simply supported beam of span 10m carrying two downward point load of 50kN each at 2m and 5m from left support. $E = 200GPa$ and $I=50\times10^6$ mm4. Use Conjugate beam method.	5	CO5	
5B.	A three hinged parabolic arch of span <b>30m</b> and central rise <b>5m</b> is subjected to UDL of <b>40kN/m</b> on whole span and point load <b>200kN</b> at <b>5m</b> from right end. Find bending moment, normal thrust and radial shear at a section <b>5m</b> from left support	5	CO5	





