

MANIPAL INSTITUTE OF TECHNOLOGY

I SEMESTER B.TECH.

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: MECHANICS OF SOLIDS [CIE 1001]

REVISED CREDIT SYSTEM

(/ /2016)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

* Answer **ANY FIVE FULL** the questions.

Missing data may be suitable assumed

1A.	Locate the resultant of forces and a couple shown in Fig.1A about point 'O'	05	CO1
1B.	A uniform ladder 4.8 m long and weighing 'W' kN is placed with one end on, ground and the other against a vertical wall. The angle of friction between all contact surfaces is 20° . Find the minimum value of angle ' θ ' at which the ladder can be inclined with the horizontal before slipping occurs.	03	C01
2A.	Find the coordinates of centroid for the shaded area shown in Fig 2A. with respect to given reference axes	05	CO2
2B.	Determine the second moment of area and radius of gyration for shaded portion shown Fig.2B with respect to given axis A-B	05	CO2
3A.	A steel flat 150 mm wide, 16 mm thick and 600 mm long carries an axial pull of 300 kN. Determine the change in length, width, thickness, volume and the percentage reduction in area. Take μ =0.3 and E = 200 GPa.	05	CO3
3B.	Derive the relationship between modulus of elasticity, bulk modulus and Poisson's ratio	05	CO3
4A.	A steel bar of 120 mm diameter is clamped at the ends. A hole of 50 mm diameter is driven for one third of its length. If the temperature of this bar is raised by 40°C, determine the maximum stress in the bar. $E = 210 \text{ GPa}$, $\alpha = 12x \ 10^{-6}/^{\circ}\text{C}$	05	CO3
4B.	Two copper bars and a steel bar together support a load of 500 kN. When they are arranged as shown in Fig.4B, it is found that there is a gap of 0.15 mm between the end of steel bar and the floor. Find the stress in each bar. Take $E_s = 2 \times 10^5 \text{ N/mm2}$, $E_{cu} = 1 \times 10^5 \text{ N/mm}^2$.	03	CO3
5A.	Explain hoop stress, longitudinal stress and joint efficiency in a thin cylinder.	03	CO4
5B.	Draw SFD and BMD for the beam shown in Fi91.5B. Locate the salient points	07	CO5





Fig.5B

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