
Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

I SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: MECHANICS OF SOLIDS [CIE 1001]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data if any, may be suitably assumed.

1A.	State and prove Varignon's theorem.	**04**
1B.	Calculate M.I of shaded portion about the vertical centroidal axis. **(FIG. 1B)**.	**06**
2A.	If the system shown **(FIG. 2A)** is in equilibrium, determine forces in bars PR and QR. Neglect friction in the pulley 'S'	**04**
2B.	A 70 mm long block has a cross section of 50 mm x10 mm. The block is subjected to a force 60 kN (Tension) on the face (50mm x 10mm) and 110kN (Compression) on the face (70mm x 10mm). Determine the force to be applied on (70mm x 50mm) face such that there is no change in volume. Given E= 200 GPa, μ = 0.3.	**06**
3A.	A force of 84 kN is applied on a compound bar which is made of solid bronze bar 0.6 m long, 35 mm diameter (d_o) and a steel tube connected in series. Allowable stress for steel is 130 MPa. Taking E_b = 85 GPa, E_s = 210 GPa, determine i) Inner diameter (d_i) of steel tube. ii) Length (L_s) of the steel portion, such that the deformation in steel tube is 1.5 times that of bronze bar. **(FIG 3A)**	**04**
3B.	Draw SFD and BMD for the figure shown and locate the point of contraflexure if any. **(FIG. 3B)**	**06**
4A.	Find the horizontal force 'P' required to be applied to the block 'B' to just move the block 'A' in the upward direction. Assume angle of limiting friction as15^0 for all contact surfaces. Given: weight of block A = 1000 N and weight of block B = 3000 N. **(FIG. 4A)**.	**06**
4B.	Obtain a relationship between Young's modulus (E) and modulus of rigidity (G).	**04**
5A.	Determine magnitude and direction of the resultant of a given force system. Also locate the resultant with respect to point 'A'.**(FIG. 5A)**	**06**
5B.	Obtain expressions for Hoop stress, longitudinal stress and change in volume of thin cylinder subjected to an internal fluid pressure 'p'.	**04**

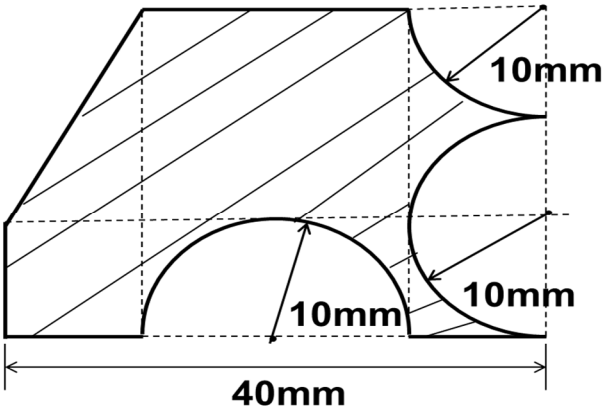

FIG 1B

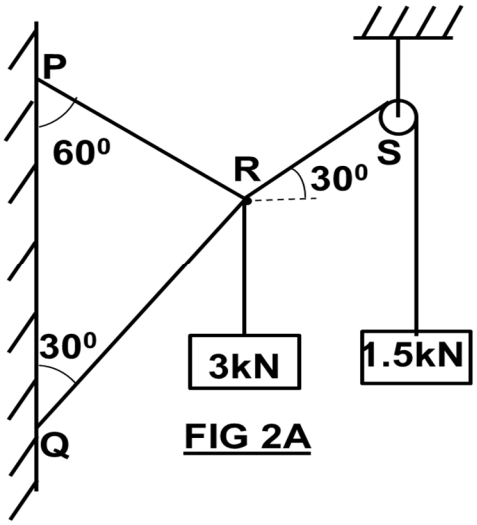

FIG 2A

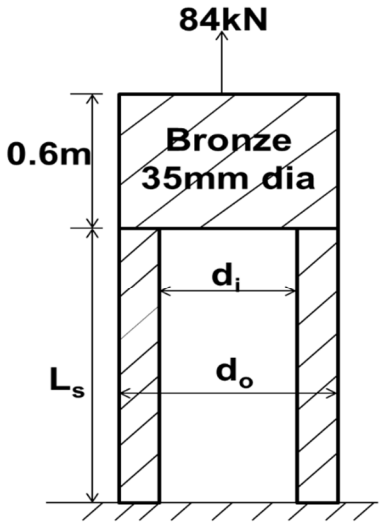

FIG 3A

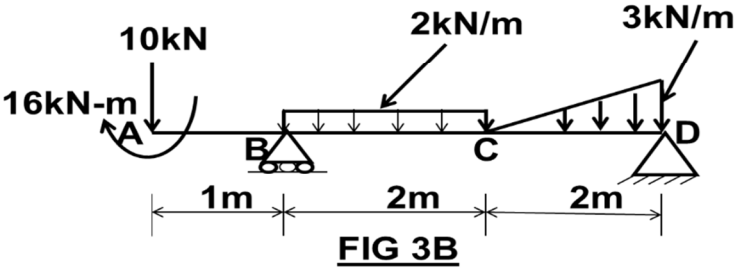

FIG 3B

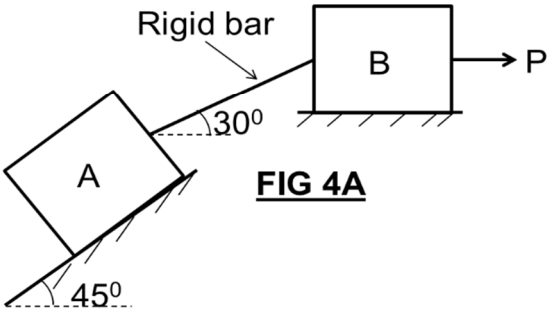

FIG 4A

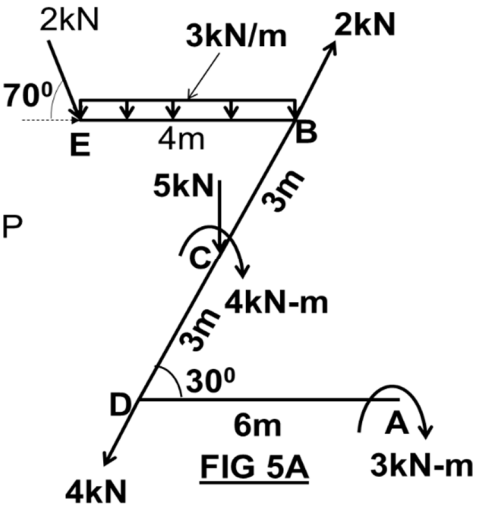

FIG 5A