Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

II SEMESTER B.TECH.

END SEMESTER EXAMINATIONS (MAKE UP) JUNE 2017

SUBJECT: MECHANICS OF SOLIDS [CIE 1001]

REVISED CREDIT SYSTEM
(16 / 06 /2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	Explain Principle of transmissibility.	**01**	**CO1**
1B.	A system of concurrent coplanar forces has five forces of which only four forces are shown in the **Fig 1B.** If the resultant force R = 255KN acting as indicated, obtain the unknown fifth force.	**04**	**CO1**
1C.	Find the reactions at the supports A and B for the beam loaded as shown in **Fig 1C**	**05**	**CO1**
2A.	A wedge is to be driven between two plates A and B as shown in **Fig 2A** Each plate weighs 2kN. Coefficient of friction at all contact surfaces is 0.25. Compute the force P required for impending motion of wedge (Ignore the weight of the wedge).	**05**	**CO1**
2B.	Determine second moment of area of the shaded portion shown in **Fig. 2B** with respect to axis 'AB'.	**05**	**CO2**
3A.	A metallic bar of 60mm in diameter is subjected to an axial pull of 200kN. The extension over a length of 100mm is 0.07mm and decrease in diameter is 0.005mm. Calculate i) young's modulus ii) poison's ratio iii) Shear modulus iv) Bulk modulus	**05**	**CO3**
3B.	The compound bar as shown in **FIG 3B** consists of three bars made up of steel, copper, aluminium and supports a rigid platform weighing 100kN. Find the stresses in each bar, if the platform remains horizontal even after the loading. $E_s = 2x\ 10^5 N/mm^2$, $E_c = 1.2 \times 10^5 N/mm^2$, $E_{al} = 1x10^5 N/mm^2$.	**05**	**CO3**
4A.	Define: a) Poisson's Ratio c) Working stress b) Shear stress d)Temperature strain	**02**	**CO3**
4B.	Obtain a relationship between volumetric strain and linear strain.	**03**	**CO3**
4C.	A composite bar consist of a steel section rigidly fastened between an aluminium section and a bronze section as shown in **Fig 4C.** Axial loads are applied at the positions indicated. Determine the total deformations of the bar. Also determine stresses in each bar. Given $E_{Br} = 100GPa$, $E_{Al} = 70GPa$, $E_{St} = 200GPa$.	**05**	**CO3**
5A.	For a thin cylinder explain the following i) circumferential stress ii) Longitudinal stress	**02**	**CO4**
5B.	A cylindrical boiler is 900mm in diameter and 1.2m length is required to withstand a pressure of $0.981N/mm^2$. If the permissible tensile stress is $25N/mm^2$ and permissible change in diameter is 0.3mm, find the minimum thickness of the metal required. Take E = 210GPa, and $\mu = 0.3$.	**02**	**CO4**
5C.	Draw SFD and BMD for the beam shown in **Fig 5C**. Locate the point of contraflexure if any.	**06**	**CO5**

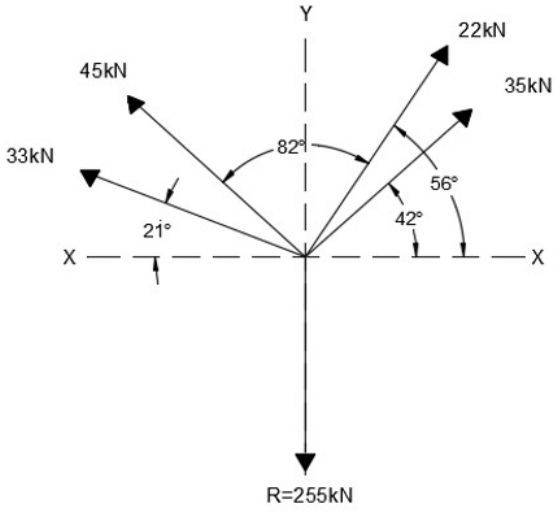

FIG 1B

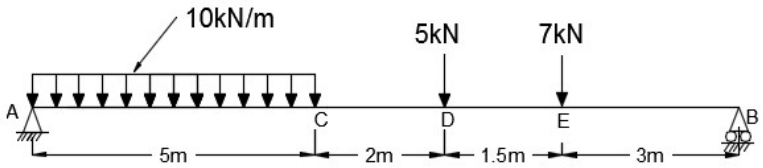

Fig. 1C

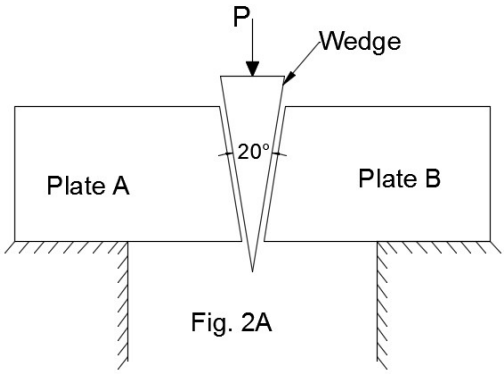

Fig. 2A

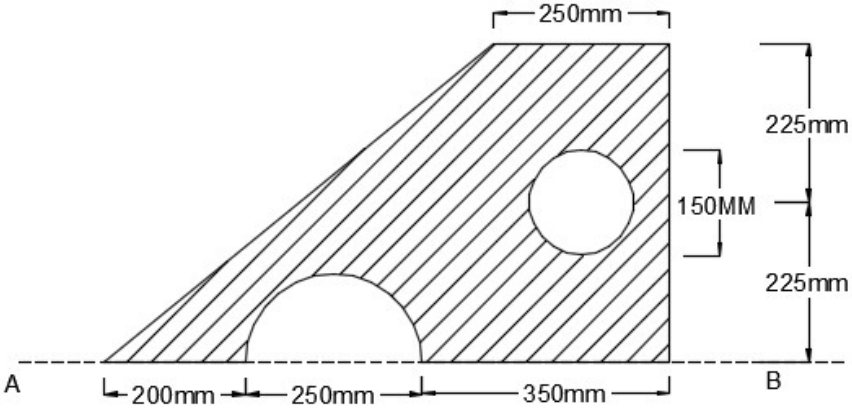

Fig. 2B

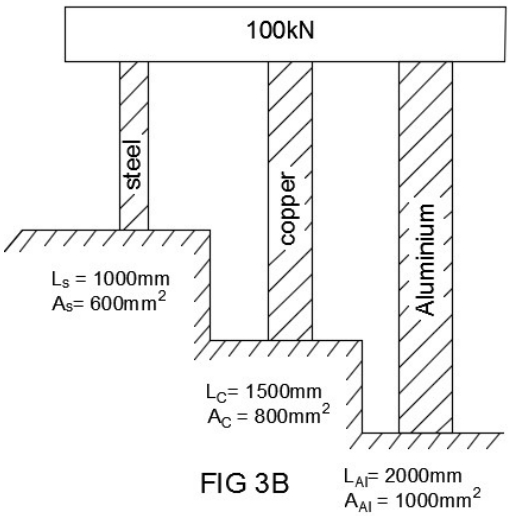

FIG 3B

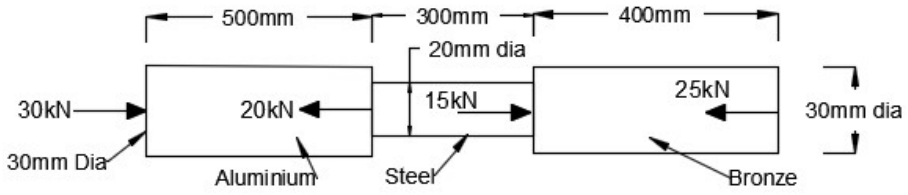

Fig. 4C

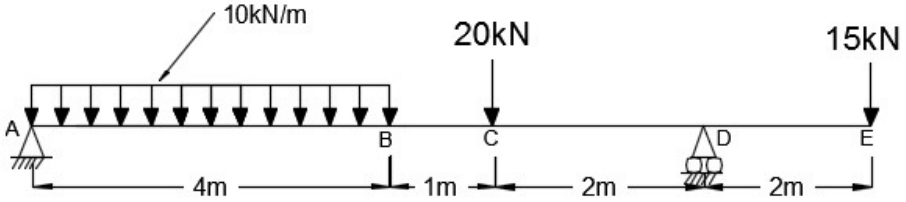

Fig. 5C