Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

III SEMESTER B.TECH. (MECHANICAL / I & P ENGINEERING)

END SEMESTER MAKE UP EXAMINATIONS, DEC 2016/JAN 2017

SUBJECT: STRENGTH OF MATERIALS [MME 2103]

REVISED CREDIT SYSTEM
(02/01/2017)

Time: 3 Hours MAX. MARKS: 50

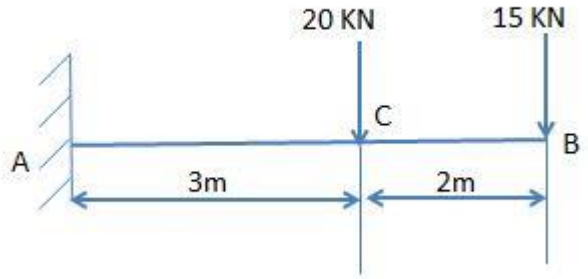
Instructions to Candidates:

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

1A. Define the following: **03**
I. Young's modulus
II. Modulus of Rigidity
III. Strain energy

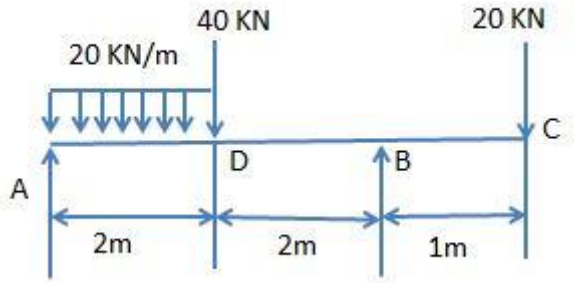
1B. State the difference between the stress-strain diagram of Ductile and Brittle materials. **02**

1C. Draw the shear force and bending moment diagram for a cantilever beam as shown in figure. **05**



2A. Draw the bending moment and shear force diagrams for a cantilever beam subjected to uniformly distributed load. **05**

2B. Draw the shear force and bending moment diagram for a simply supported beam as shown in figure. Also determine the point of contra flexure. **05**



3A. Derive an expression for shear stress in beams. **05**

3B. A cantilever beam of square section 200 mmx200 mm and 2 m long, fails when a load of 12 KN is placed at its free end. A beam of same material and having a rectangular cross-section 150 mm wide and 300 mm deep is simply supported over a span of 3 m. Calculate the central concentrated load required to break the beam. **05**

4A. Derive an equation for slope and deflection for a cantilever beam subjected to a uniformly distributed load. **05**

4B. A simply supported beam of 6 m span is subjected to a concentrated load of 18 KN at 4 m from the left support. Calculate the maximum deflection and the slope at mid span using Macaulay's method. **05**

5A. Derive an expression for torsion equation in shafts. **04**

5B. Calculate the Euler's load for a hollow rectangular cross section using the following data, **02**

σ_c =400MPa

E=200 GPa

Ixx=55.21x10^6 mm^4, Iyy=95.83x10^6 mm^4

Effective length is 5 m and both ends are fixed

A=25000 mm^2

5C. A pipe of 400 mm internal diameter and 100 mm thickness contains a fluid at a pressure of 80 N/mm^2.Find the minimum hoop stress in the section of the pipe using Lame's equation. **04**