Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2016-JAN 2017

SUBJECT: MEASUREMENTS & METROLOGY [AAE 3154]

REVISED CREDIT SYSTEM
(05/01/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.
- Draw Sketches using **PENCIL** only.

1A. Sketch and explain the international prototype meter. **(03)**

1B. Indian standard IS919 caters for either a hole based or shaft based system of fits. Explain why a hole based system is generally preferred. Quote one example where it would be desirable to use shaft based system in the standard limit system. **(02)**

1C. Define the following terms used in Limits, Fits and tolerances. a) Zero-line b) Allowance c) Fundamental deviation d) Tolerance and e) Maximum Material Condition. **(05)**

2A. The accompanying curve in Fig. 1 shows pressure ratios plotted against ratios of jet cross-sectional areas in a back-pressure pneumatic gauging system. In the schematic diagram, P is the applied pressure and C and M are the cross-sectional areas of the control jet and measuring jet respectively. The curve is linear between values from p/P=0.6 to 0.8.
Illustrate that the linear range of measurement is half the mean value of M. **(03)**

2B. Sketch and Explain the working principle Optical Comparator. **(02)**

2C. Explain the concept of optical interference in the following cases. **(05)**
a) 2- waves of different amplitudes that are in phase.
b) 2- waves of different amplitudes, out of phase by 180 degrees.

3A. Discuss the working principle of Bourdon Tube with a sketch. **(03)**

3B. Explain with neat diagram the working principle of Pitter N.P.L. interferometer. **(05)**

3C. State and explain Taylor's principle of gauge design. **(02)**

4A. Derive the expression for finding the effective diameter of a metric thread by using three wire approach. **(05)**

4B. Write any four relative advantages and disadvantages of optical comparator over mechanical comparators. **(02)**

4C. Sketch and explain the working of Pirani Thermal Conductivity Gauges. **(03)**

5A. Calculate the base tangent for a 20^0 pressure angle gear, having 35 teeth and module of 4. Consider No.of teeth spanned as 3. **(02)**

5B. Explain the working of unequal balance and produce the equation. **(03)**

5C. Obtain the expression for gear tooth measurement by constant chord method. **(05)**

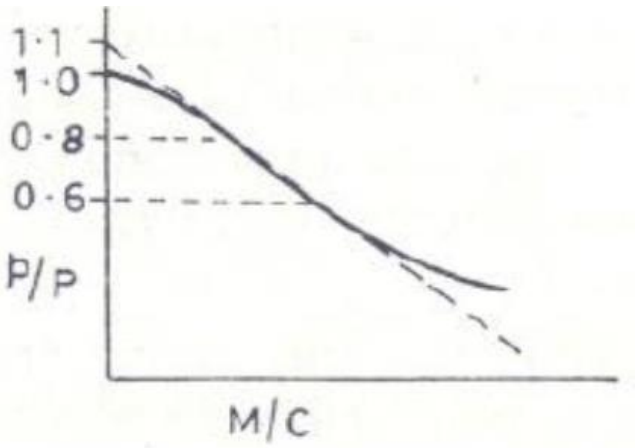

Fig 1