Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
A Constituent Institute of Manipal University, Manipal

II SEMESTER B.TECH END SEMESTER EXAMINATIONS, JUNE 2017

SUBJECT: BASIC MECHANICAL ENGINEERING [MME 1001]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:
- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Use of Steam Tables is permitted

1A. Sketch and label all the parts of a water tube boiler and also indicate the path of flue gases & water on it. **05**

1B. Calculate the power transmitted by a 150mm wide crossed belt drive system from the following data:

Speed of the driver pulley = 1600rpm; Small pulley diameter = 30cm

Speed reduction ratio = 4; Centre distance = 1m **05**

Coefficient of friction between the belt and pulley=0.28,

Permissible tension per meter width of belt=10kN.

2A. A steam boiler takes water at 30^0C and generates superheated steam having an enthalpy value of 3000kJ/kg. The superheated steam is then passed through the pipeline to a steam turbine. It is found that the steam looses 293.4kJ/kg at constant pressure in the pipeline and becomes saturated before it enters the steam turbine. Take specific heat of super-heated steam as 2.25KJ/kg K. **05**

i) What is the pressure at which the steam is generated?

ii) What is the temperature of the superheated steam from the boiler?

Also draw the temperature-enthalpy diagram for the above process.

2B. Derive an expression for the velocity ratio of simple gear train and explain with sketch the working of stepped cone pulley arrangement. **05**

3A. With neat sketches explain the working of a four-stroke C.I engine. Also show the theoretical P-V diagram. **05**

3B. The following data were obtained during the trial of a four-stroke diesel engine. Cylinder diameter = 250mm, Stroke = 400mm, Total revolutions made per hour = 15000, Brake load = 70 kg, Brake drum diameter = 2m, Mean effective pressure = 0.6 MPa, Fuel consumed = 100 cc/min, Specific gravity of fuel = 0.78, Calorific value of fuel = 43,900 kJ/kg. Calculate indicated power, brake power, Frictional power, mechanical efficiency, indicated thermal efficiency and brake thermal efficiency. **05**

4A. Sketch and explain the steps involved in green sand moulding of solid sphere and list the common defects in sand casting. **05**

4B. With a labeled sketch explain Radial drilling machine and draw the specifications of lathe machine tool. **05**

5A. Illustrating the pressure-velocity changes, explain the working of a reaction turbine. **05**

5B. Explain with a neat sketch, the resistance spot welding process and differentiate between straight and reverse polarity in relation to Arc welding. **05**