MANIPAL INSTITUTE OF TECHNOLOGY
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**I SEMESTER B.TECH END SEMESTER EXAMINATIONS,
DEC 2015/JAN 2016 (MAKE UP)**

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 suitable assumed.
❖ Use of Steam Table is permitted

1A) Sketch and label the parts of a water tube boiler and differentiate between a water tube boiler and a fire tube boiler.

(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,
Coefficient of friction between the belt and pulley=0.28,
Permissible tension per meter width of belt=10kN.   (05)

2A) With neat sketches and a P-V diagram explain the working of a four-stroke S.I engine.   (05)

2B) Derive an expression for velocity ratio in a gear drive and explain with a sketch the working of a fast and loose pulley arrangement.   (05)

3A) Sketch and explain the working of a reaction turbine.   (05)

3B) Sketch and explain arc welding process and differentiate between plastic welding and fusion welding.   (05)

4A) Water is fed to a boiler at 30^0C and it generates superheated steam having an enthalpy of 3000kJ/kg. The superheated steam is then led through a pipeline to a steam turbine. It is found that the steam loses 293.4kJ/kg of heat at constant pressure in the pipeline and becomes saturated before it enters the steam turbine.

   i) What is the pressure at which the steam is generated?
   ii) What is the temperature of the superheated steam from the boiler?
   Assume specific heat of super-heated steam as 2.25KJ/kg K.
   Draw the temperature-enthalpy diagram for the above process. (04)

4B) Explain with a neat sketch the material removal process in an engine lathe and give its classification. (03)

4C) With a block diagram explain the components of a refrigeration system. (03)

5A) The power output of a six-cylinder four stroke diesel engine is given by a law which is $B_LN/20000$ KW, where B_L is the brake load in newton and N is the speed in rpm. The bore and stroke of the engine are 90 mm and 120 mm respectively. Fuel consumption is $5cm^3/s$ and its density is 800 kg/m^3. Determine the following (i) Brake power (ii) the torque and (iii) the brake specific fuel consumption, if the brake load is 600 N and speed of engine is 2000 rpm. (04)

5B) Sketch and explain a single piece pattern and a split pattern used in sand casting process. (03)

5C) With a schematic diagram explain the working of a thermal power plant. (03)