

## INTERNATIONAL CENTRE FOR APPLIED SCIENCES (Manipal University) II SEMESTER B.S. DEGREE EXAMINATION – NOV. 2017 SUBJECT: BASIC MECHANICAL ENGINEERING (ME123) (Branch: Mech.) Thursday, 23 November 2017

Reg.No.

## Time: 3 Hours

Max. Marks: 100

- ✓ Answer ANY FIVE full Questions.
- ✓ Use of steam tables is permitted.
- 1A. Sketch and label Babcock and Wilcox boiler.
- 1B. With a neat sketch, explain the working principle of a Nuclear power plant. What is criticality in a nuclear power plant?
- 1C. Two kg of dry saturated steam at 1 MPa is produced from the water at 40°C. Determine (7+8+5) the quantity of heat supplied. The specific heat of water  $C_{pw}$ =4.18kJ/kg.
- 2A. With a temperature enthalpy diagram, explain, in detail, the formation of steam at constant pressure.
- 2B. Explain the working principle of an open cycle gas turbine with a sketch.
- 2C. Explain the working principle of an impulse turbine with pressure velocity plot. (8+4+8)
- 3A. With a neat sketch explain the working of a vapor compression refrigerator.
- 3B. What is the function of a carburettor? Draw a neat sketch and label its components. Also (10+10) explain its working principle.
- 4A. A single cylinder four stroke engine has a swept volume of 4.5 litre. The m.e.p is 0.65 MPa and the engine speed is 505 rpm. If there are 250 explosions per minute and the brake torque is 176 Nm, find the indicated power and brake power of the engine.

## 4B. Define

- i) Brake Thermal Efficiency
- ii) Mean effective pressure
- iii) Swept volume
- iv) Clearance volume
- v) Scavenging
- vi) Expansion or power stroke
- 4C. Compare a two stroke engine with a four stroke engine.

(7+6+7)

- velocity ratio for compound gear train. With sketches, discuss five types of gears. Power transmitted between two shafts 3.5m apart by a crossed belt drive around two pulleys 0.6m and 0.3m in diameters is 6kW. The speed of the larger pulley is 220 rpm. The permissible load on the belt is 25N per mm width of the belt which is thick. The coefficient of friction between the smaller pulley surface and the belt is 0.35. Determine: The necessary length of the belt The width of the belt The necessary initial tension in the belt What is welding? What are the classifications of welding? Discuss the principle of Arc 7A. welding. Differentiate between soldering and brazing. 7B. 7C. With figures, discuss two types of patterns used in casting. (8+4+8)Draw the block diagram of a radial drilling machine. Explain five different drilling 8A. operations. 8B. With a sketch, explain how the size of a lathe is specified. Discuss four lathe operations. (10+10)
- 5B. Define heat treatment. Name the different heat treatment processes. Discuss any one of them.

What are the different types of ferrous metals and non-ferrous metals?

- 5C. What is a gear train? Sketch a compound gear train and derive the expression for the (8+4+8)
- 6A.

5A.

6B. (10+10)