

## INTERNATIONAL CENTRE FOR APPLIED SCIENCES (Manipal University) II SEMESTER B.S. DEGREE EXAMINATION – JUNE 2016 SUBJECT: BASIC MECHANICAL ENGINEERING (ME123) (BRANCH: MECH/AVI/IP) MONDAY, 13<sup>TH</sup> JUNE, 2016

Reg.No.

### Time: 3 Hours

प्रज्ञानं ब्रह्म

- ✓ Answer ANY FIVE full Questions.
- ✓ Use of steam tables is permitted.
- 1A) One kg of steam at 1.5 MPa contains 3000 kJ of heat energy. Find the temperature of the steam. If 500kJ of heat energy is removed at the same pressure, what is the condition of the steam? The specific heat of superheated steam, C<sub>ps</sub>= 2.25 kJ/kgK.
- 1B) With a neat sketch, explain the working of a hydel power plant. Briefly describe the different components of a hydel power plant.
- 1C) Draw a fully labelled sketch of a two stroke petrol engine.
- 2A) Define Boilers. What is the function of a Boiler? How are boilers classified?
- 2B) With pressure velocity plot explain the working of a reaction turbine.
- 2C) What is a prime mover? How are prime movers classified?
- 3A) Explain the properties of an ideal refrigerant.
- 3B) Write a short note on
  - i) COP
  - ii) TOR
- 3C) With a neat sketch, explain splash lubrication. What is flash point?

# (08+04+08)

- 4A) A gas engine working on a four stroke cycle has a cylinder of 250 mm diameter, length of stroke 450 mm, and is running at 180 rpm. Its mechanical efficiency is 80% when the mean effective pressure is 0.65Mpa. Find
  - i) indicated power
  - ii) brake power
  - iii) friction power
- 4B) With the required sketches explain the working of a four stroke diesel engine.

(10+10)

(08+08+04)

(06+10+04)

Max. Marks: 100

- 5A) Compare Normalising and Annealing processes.
- 5B) Mention the advantages and disadvantages of using chain drives.
- 5C) The shaft from the motor is connected to gear A and rotates at 1800 rpm. Gear B and C is compound gear as well as D and E. Gear A meshes with gear B and gear C drives gear D. The gear E meshes with gear F which is fixed on output shaft. The speeds of Gear E and Gear F are 300 rpm and 100 rpm respectively. Number of teeth on gear A, B, D and F are 20,40,75 and 60 respectively. Sketch arrangement. Find the velocity ratio of the gear train. Find the number of teeth of Gear C. Also find the speed of rotation of Gear B in rpm.

#### (06+06+08)

- 6A) Explain the following terms
  - i) Addendum
  - ii) Dedendum
  - iii) Pitch Circle
  - iv) Hardening
  - v) Rusting
  - vi) Creep
- 6B) The sum of the diameters of two pulleys A and B connected by a belt is 600mm. If they run at 1400 rpm and 2800 rpm respectively, determine the diameter of each pulley.
- 6C) What is a gear train? Sketch a simple gear train and derive the expression for the velocity ratio for a simple gear train.

#### (06+06+08)

- 7A) What is welding? With a neat sketch explain the principle of oxy-acetylene gas welding.
- 7B) What are the different types of flames used for welding?
- 7C) What are the common defects in casting?

#### (08+06+06)

- 8A) What are the ingredients of moulding sand? What are the desirable properties of moulding sand?
- 8B) Draw a neatly labelled block diagram of a lathe. Briefly describe cross slide and compound rest.
- 8C) What are the different taper allowances?

#### (07+07+06)

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