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Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(Marine Engineering) (2013 Onwards)/**
**B.Tech.(ME) (2011 Onwards) (Sem.–3)**
**APPLIED THERMODYNAMICS–I**
**Subject Code : BTME-304**
**M.Code : 59114**

**Time : 3 Hrs.** **Max. Marks : 60**

**INSTRUCTION TO CANDIDATES :**

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

## SECTION-A

**Q1. Answer briefly :**

a) What is the method to determine the calorific value of Gaseous fuels? Give its principle.

b) How does the engine temperature and pressure influence the knocking in Spark Ignition Engines?

c) What is the purpose of supercharging in Engines?

d) Differentiate among wet, dry and saturated and superheated steam.

e) Give the examples of Modern High Pressure Boils.

f) Give a sketch of Binary vapour cycle.

g) How are steam nozzles different from liquid nozzles?

h) How do you define degree of reaction and its calculation?

i) What is the objective of reheating in a steam turbine?

j) List the various types of condensers giving its principle.

## SECTION-B

Q2. Explain the working of La-Mont Boiler giving its principle and schematic sketch.

Q3. What is critical pressure ratio in a steam nozzle? What is its significance and its effect on discharge.

Q4. Define the terms axial thrust, work and black efficiency for a reaction turbine.

Q5. What is the role of air pump in condensers? How do you calculate its capacity?

Q6. What is meant by Octane and Cetane rating of fuels? Discuss.

## SECTION-C

Q7. A steam generator evaporates 18000 kg/h of steam at 12.5 bar and a quality of 0.97 from feed water at 105°C when coal is fired at the rate of 2040 kg/χ. If the higher calorific value of the coal is 27400 kJ find.

a) The heat rate of boiler in kJ/n

b) The Equivalent Evaporation

c) The Thermal Efficiency.

Q8. A steam nozzle is supplied steam at 15 bar 350°C and discharges steam at 1 bar. If the diverging portion of the nozzle is 80 mm long and the throat is 6mm, determine the cone angle of the divergent portion. Also determine the velocity and temperature of the steam at throat.

Q9. A 50% reaction turbine with symmetrical velocity triangles running at 400 rpm has the exit angle of the blades as 20° and the velocity of steam relative to the blades at the exit is 1.35 times the mean blade speed. The steam flow rate is 8.33 kg/s and at a particular stage the specific volume is 1.381 $m^3$/kg. Calculate for this stage

a) A suitable blade height, assuming rotor mean diameter 12 times the blade height. And

b) The Diagram work.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**