

Roll No.

Total No. of Pages :02

Total No. of Questions : 09

B.Tech. (CHE) (2011 Onwards E-III) (Sem.–7,8)

**PLANT UTILITIES**

Subject Code : BTCH-823

M.Code : 71890

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS 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**

**1. Answer briefly :**

- a. Define a Water Tube Boiler with an example.
- b. What are the advantages of backward curved blades in compressor?
- c. What do you understand by boiler mounting?
- d. What do you mean by octane number of fuels?
- e. Draw a schematic diagram of VC cycle.
- f. What are limitations of single stage compressor?
- g. What is the use of cooling tower in process plants?
- h. What are the common methods of waste disposal?
- i. Draw a PV and TS diagram for Otto cycle.
- j. What do you understand by quality of steam?

### SECTION-B

2. Calculate the dryness fraction of steam which has 1.5kg of water in suspension with 50 kg of steam.
3. Draw a valve timing diagram of 4 stroke SI engine.
4. What is main characteristic feature of an air refrigeration system?
5. Describe briefly an axial flow compressor.
6. Write the differences between forced draft fan and induced draft fan used in cooling tower.

### SECTION-C

7. A single stage single acting air compressor delivers 0.6 kg of air per minute at 6 bar. The temperature and pressure at the end of suction stroke are 30° C and 1 bar. The bore and stroke of the compressor are 100 mm and 150 mm respectively. The clearance is 3% of the swept volume. Assuming the index of compression and expansion to be 1.3, find:
  - a) Volumetric efficiency of the compressor
  - b) Power required if the mechanical efficiency is 85%, and
  - c) Speed of the compressor (R.P.M).
8. Give the construction and working of the following water tube boiler:
  - a) Babcock and Wilcox boiler
  - b) Stirling boiler
9. Compare the relative advantages and disadvantages of four stroke and two stroke cycle engines.

**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.**