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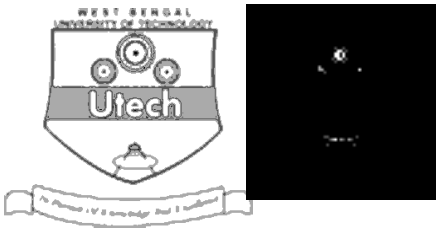
CS/M.TECH (CT)/SEM-2/M(CT)-204-F/09
FURNACE TECHNOLOGY (SEMESTER - 2)



1. .....
Signature of Invigilator

2. .....
Signature of the Officer-in-Charge

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

CS/M.TECH (CT)/SEM-2/M(CT)-204-F/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JULY – 2009

FURNACE TECHNOLOGY (SEMESTER - 2)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. You have to answer the questions in the space provided marked 'Answer Sheet'. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

Question Number											***Total Marks***	***Examiner's Signature***
Marks Obtained												

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Head-Examiner/Co-Ordinator/Scrutineer

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CS/M.TECH (CT)/SEM-2/M(CT)-204-F/09

FURNACE TECHNOLOGY

SEMESTER – 2

Time : 3 Hours] [Full Marks : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions. 5 × 14 = 70

1. Define furnace, kilns, dryer and oven. Classify furnaces. Discuss necessity of energy audit for ceramic industries. What do you mean by stack or waste gas losses ? Define efficiency of furnace. Why is continuous furnace more efficient than batch type furnace ? Explain nine essential steps for efficient use of energy. 2 + 4 + 1 + 1 + 2 + 4

2. Define furnace draught. Deduce an equation for natural draught of a chimney. Calculate the draught in mm of water column produced by a chimney of 40 metre height where the temperature of the gases within the chimney is 300° C and that of outside air is 20° C. The amount of air supplied for burning of 1 kg of fuel is 18·5 kg. 1 + 8 + 5

3. Classify draught. Why is draught needed for operation of furnaces ? How is natural draught then created ? Explain the advantages of artificial draught over natural draught. Why is actual draught less than the theoretical one ? 2 + 2 + 3 + 5 + 2

4. Define recuperator. Classify and explain recuperators according to direction of flow. Make a comparison between metallic and ceramic recuperators. Describe the operation of a pebble regenerator with a simple sketch. 1 + 5 + 4 + 4

5. Write major factors affecting fuel economy. Explain that complete combustion with minimum excess air can enhance fuel economy. How can optimum capacity utilisation reduce energy loss ? State the advantages of hot combustion air. 3 + 5 + 4 + 2

6. State the formula for effectiveness of a recuperator. What are the parameters you must consider to design a recuperator ?

Calculate the effectiveness of a heat exchanger with the following data :

$t_{h,\,in}$ = 900° C, $t_{h,\,out}$ = 750° C, $t_{c,\,in}$ = 35° C, $t_{c,\,out}$ = 250° C, c_h = 975 × 0·25 and c_c = 550 × 0·25.

Estimate the height of a chimney to produce a static draught of 35 mm of water column if the mean temperature of the gases in the chimney is 300° C and temperature of outside air is 30° C. The densities of atmospheric air and flue gases at N.T.P. are 1·293 kg/m^3 and 1·34 kg/m^3 respectively. 1 + 2 + 3 + 8

7. Explain the operation of a tunnel kiln with a simple sketch along with firing, schedule for production of 45% Al_2O_3 refractories. List down different energy, conservation practices in the ceramic industries. 11 + 3

8. Discuss the operation of 'Roller Hearth Kiln' for firing 'glazed tile' indicating firing schedule followed, type of rollers used in different zones and selection of fuel. Mention the relative advantages of such kiln compared to other kilns as for tile industries.

END