FOOD PROCESS EQUIPMENT DESIGN (SEMESTER - 6)

CS/B.Tech (FT)/SEM-6/FT-604/09

1. ..... *Signature of Invigilator*

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

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

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

CS/B.Tech (FT)/SEM-6/FT-604/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

FOOD PROCESS EQUIPMENT DESIGN (SEMESTER - 6)

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. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. 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

	Group – A										Group – B				Group – C				
Question Number																		***Total Marks***	***Examiner's Signature***
Marks Obtained																			

.....

Head-Examiner/Co-Ordinator/Scrutineer

6802 (11/06)

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GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 ∞ 1 = 10

i) Vertical vessels are not supported by

a) brackets b) skirts

c) columns d) saddles

ii) Baffles may be eliminated for

a) low viscosity liquids b) high viscosity liquids

c) large diameter tanks d) none of these.

iii) ..... shaped roof is most commonly used for cylindrical tanks.

a) Cone b) Dome

c) Umbrella d) Flat.

iv) For high pressure process equipment/vessels, the connected nozzle should be

a) welded b) screwed

c) flanged d) brazed.

v) …… heat exchanger is also known as 'hair pin type' exchanger.

a) Double pipe b) Finned

c) Plate type d) Regenerative. ☐

vi) Cylindrical storage tanks used for the storage of volatile liquids have …… roof.

a) conical b) flat

c) floating d) fixed. ☐

vii) …… liquor is best handled in a long tube vertical evaporator.

a) Foamy b) Scaling

c) Viscous d) Salting. ☐

viii) For a given fluid, as the pipe diameter increases, the pumping cost

a) decreases

b) increases

c) remain unaffected

d) may increase or decrease depending upon whether the fluid is Newtonian or not. ☐

ix) Lug support is meant for supporting …… vessels.

a) large horizontal b) tall but empty

c) small d) thick walled tall. ☐

x) The force due to wind load acting on a tall vessel depending upon its

a) shape b) outside diameter

c) height d) all of these. ☐

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Present the anatomy of a process plant.

3. Mention the external and internal constraints in design of equipment.

4. How does the scismic force affect the design as well as stresses ?

5. Write short notes on any *two* of the following : $2 \times 2\frac{1}{2}$

   a) Two-stage homogenizer

   b) Gas distribution for fluidized bed system

   c) Fruit juice extractor

   d) Freeze drier

   e) Design of jacketed vessel under external pressure.

   f) Batch and continuous sterilization systems.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

6. a) What is vortex shedding ?

   b) To prepare a concentrated fruit juice (40% solid) from 15% weak juice a bypass line is required. The liquid just after evaporator contain 55% solid. Calculate the fraction of fruit juice that bypasses the evaporator. 3 + 12

7 a) Prepare dry milk powder from milk having 70% water. Air entering to the spray dryer at 170°C and leaving humid air contain 12 mole% water, 85°C, 1 atm pressure and flow rate 18000 m^3/hr. Calculate production rate of powdered milk and molal flow rate of inlet air.

   b) Write the equation of calculate the axial stress due to dead loads. 12 + 3

8 A vessel is to be designed to withstand and internal pressure of 150 MN/m^2. An internal diameter of 300 mm is specified and a steel having a yield point of $450MN/m^2$ has been selected. Calculate the wall thickness required by the various theories with a safety factor, 1.5. 15

9. It is necessary to design a tray drier for drying of fish. What factors should be considered for determination of dimension of drying chamber and trays ? What factors should you consider for the design of the drying unit for its satisfactory operation ? How can you predict the drying rate and drying time of fish in this type of drier ?

5 + 10

10. What are the major uses of a plate freezer ? What material is used for the construction of the gridded freezer plate ? How can you determine the freezing time in a plate freezer ?

END