UNIT OPERATION-II (SEMESTER - 4)

CS/B.TECH (CT)/SEM-4/CHE(CT)-401/09

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

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

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

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

CS/B.TECH (CT)/SEM-4/CHE(CT)-401/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

UNIT OPERATION-II (SEMESTER - 4)

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

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Head-Examiner/Co-Ordinator/Scrutineer

4600 (12/06)

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ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

UNIT OPERATION-II

SEMESTER - 4

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

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

i) Mesh nuber is designated by opening per

a) linear inch b) square inch

c) inch square d) none of these. ☐

ii) For needle like particle, D_p would refer to

a) thickness b) length

c) width d) none of these. ☐

iii) What is the characteristic action of ultra-fine grinder ?

a) Compression b) Impact

c) Attrition d) None of these. ☐

iv) Soft material could be comminuted in mill by

a) revolving b) hammer

c) roller d) none of these. ☐

v) Most efficient mill utilises the percentage of energy input to fracture

a) 90 b) 60

c) less than 1 d) none of these. ☐

vi) Capacity and effectiveness of screen are

a) opposing factor b) supplementary

c) not related d) none of these.

vii) Ball mills are filled with mateial plus balls of it volume in percent

a) 100 b) 90

c) 60 - 80 d) None of these.

viii) Dimension of filter medium resistance R_m is

a) L^{-1} b) L^{-2}

c) ML^{-1} d) none of these.

ix) According to penetration theory, mass transfer coefficient is proportional to

a) $D_{AB}^{0\cdot5}$ b) D_{AB}

c) $D_{AB}^{0\cdot25}$ d) none of these.

x) To get dried flake / tape type ceramic material from slurry, what type of dryer is to be used ?

a) Tray dryer b) Rotary drum dryer

c) Spray dryer d) None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following questions. 3 × 5 = 15

2. Describe the working principle of smooth roll crusher and mention the theoritical capacity of it.

3. Deduce the Mohr stress circle relationship in packed particulate material.

4. Define the critical speed of a ball mill and deduce the expression.

5. In adiabatic dryer, explain the different mode of solid handling with sketch.

6. Describe the principle of mixing of dry particulate solid.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions. 3 × 15 = 45

7. a) Derive an expression for equimolal counter current diffusion of gas under steady state. 7

b) A 2 mm I.D. tube, 2 m long and closed at one end is filled with acetone to a depth of 1 cm. How long would it take to evaporate the acetone completely, if the tube was maintained at temperature of 20°C in a current of air ?

Vapour pressure of a acetone : 180 mm of Hg

Atmospheric pressure : 760 mm of Hg

Diffusivity of acetone at 20°C : $0{\cdot}10\ cm^2/s$.

P_L = 0·79 g/c.c. ; M_L = 58. 8

8. a) Give a neat sketch of Blake type jaw crusher showing all the different parts. Compare the action of this crusher with that of Dodge type. 9

b) A ball mill of 60 cm diameter was made of mild steel. Inside the mill, there was a lining of 2 cm thickness. If 5 cm dia. balls are used, what is the critical speed of the mill ? 6

9. a) Explain the working principle of spray dryer with neat sketch. 7

b) A commercial dryer required 7 hours to dry a moist material from moisture content of 33% to 9% on dry basis. The critical moisture content was 16% and the equilibrium moisture content was 5%. Determine the time required to dry the material from 37% to 7% moisture content at constant drying condition. 8

10. a) Explain the term 'Equilibrium moisture content' and 'Bound moisture content'. Discuss the mechanism of moisture movement through porous solid. 7

b) A batch of 250 kg of wet solid is dried in a tray dryer under constant drying condition. Initial moisture content is 30% and equilibrium moisture content is 5%. It took 4 hours to dry the solid placed in 20 trays each tray being 2 ft × 2 ft to a moisture content of 16%. If the critical moisture content be 12%, how much time is required to dry the same solid from 30% to 8% ? All moisture contents are expressed in dry basis. 8

11. Distinguish between compressible and incompressible filter cake. Define the specific cake resistance. Derive the correlation to show that in continuous filtration, the filtrate flow-rate varies with viscosity and the cycle time. 2 + 4 + 9

END