14 RULES FOR WRITING MULTIPLE-CHOICE QUESTIONS

1. Use Plausible Distractors (wrong-response options)

- Only list plausible distractors, even if the number of options per question changes
- Write the options so they are homogeneous in content
- Use answers given in previous open-ended exams to provide realistic distractors

2. Use a Question Format

- Experts encourage multiple-choice items to be prepared as questions (rather than incomplete statements)

Incomplete Statement Format:

The capital of California is in _____ ← Less Effective

Direct Question Format:

In which of the following cities is the capital of California? ← More Effective

3. Emphasize Higher-Level Thinking

- Use memory-plus application questions. These questions require students to recall principles, rules or facts in a real life context.
- The key to preparing memory-plus application questions is to place the concept in a life situation or context that requires the student to first recall the facts and then apply or transfer the application of those facts into a situation.
- Seek support from others who have experience writing higher-level thinking multiple-choice questions.

EXAMPLES:

Memory Only Example

Which description best characterizes whole foods?
a. orange juice
b. toast ← Less Effective
c. bran cereal
d. grapefruit

Prepared by Timothy W. Bothell, Ph.D.
Faculty Development Coordinator: Assessment of Student Learning
422-8194 tim_bothell@byu.edu

Memory-Plus Application Example ← Effective

Sally's breakfast this morning included one glass of orange juice (from concentrate), one slice of toast, a small bowl of bran cereal and a grapefruit. What "whole food" did Sally eat for breakfast?
a. orange juice
b. toast
c. bran cereal
d. grapefruit

Memory-Plus Application Example ← Effective

Which one of the following best illustrates the law of diminishing returns?

a. The demand for a farm product increased faster than the supply of the product.
b. The population of a country increased faster than the means of subsistence.
c. A machine decreased in utility as its parts became worn.
d. A factory doubled its labor force and increased production by 50 percent.

Ability to Interpret Cause-and-Effect Relationships Example ← Effective

Why does investing money in common stock protect against loss of assets during inflation?

a. It pays higher rates of interest during inflation.
b. It provides a steady but dependable income despite economic conditions.
c. It is protected by the Federal Reserve System.
d. It increases in value as the value of a business increases.

Ability to Justify Methods and Procedures Example ← Effective

Why is adequate lighting necessary in a balanced aquarium?

a. Fish need light to see their food.
b. Fish take in oxygen in the dark.
c. Plants expel carbon dioxide in the dark.
d. Plants grow too rapidly in the dark.

3. Emphasize Higher-Level Thinking (continued)

Faculty Comment:

"I had previously thought that these higher-level questions would require a lot more work than they do. I also enjoy being more creative as I cast the topic into a unique setting that requires my students not only to recall but also to apply concepts. However, what has surprised me most is how much more my students 'enjoy' higher-level assessment questions than recall questions. "

4. Keep Option Lengths Similar

- Avoid making your correct answer the long or short answer

5. Balance the Placement of the Correct Answer

- Correct answers are usually the second and third option

6. Be Grammatically Correct

- Use simple, precise and unambiguous wording
- Students will be more likely to select the correct answer by finding the grammatically correct option

7. Avoid Clues to the Correct Answer

- Avoid answering one question in the test by giving the answer somewhere else in the test
- **Have the test reviewed by someone who can find mistakes, clues, grammar and punctuation problems before you administer the exam to students**
- Avoid extremes – never, always, only
- Avoid nonsense words and unreasonable statements

8. Avoid Negative Questions

- 31 of 35 testing experts recommend avoiding negative questions
- Students may be able to find an incorrect answer without knowing the correct answer

9. Use Only One Correct Option (Or be sure the best option is clearly the best option)

- The item should include one and only one correct or clearly best answer
- With one correct answer, alternatives should be mutually exclusive and not overlapping
- Using MC with questions containing more than one right answer lowers discrimination between students

10. Give Clear Instructions

Such as:

Questions 1 - 10 are multiple-choice questions designed to assess your ability to remember or recall basic and foundational pieces of knowledge related to this course. Please read each question carefully before reading the answer options. When you have a clear idea of the question, find your answer and mark your selection on the answer sheet. Please do not make any marks on this exam.

Questions 11 – 20 are multiple-choice questions designed to assess your ability to think critically about the subject. Please read each question carefully before reading the answer options. Be aware that some questions may seem to have more than one right answer, but you are to look for the one that makes the most sense and is the *most correct*. When you have a clear idea of the question, find your answer and mark your selection on the answer sheet. You may justify any answer you choose by writing your justification on the blank paper provided.

11. Use Only a Single, Clearly-Defined Problem and Include the Main Idea in the Question

- Students must know what the problem is without having to read the response options

12. Avoid the "All the Above" Option

- Students merely need to recognize two correct options to get the answer correct

13. Avoid the "None of the Above" Option

- You will never know if students know the correct answer

14. Don't Use MC Questions When Other Item Types Are More Appropriate

- limited distractors or assessing problem-solving and creativity

SIXTH SEMESTER B.TECH DEGREE EXAMINATION

(Model Question)

(2013 scheme)

13.601 MASS TRANSFER OPERATIONS I

Maximum-100 marks **Time 3 hours**

Part A

*Answer **all** questions. Each question carries **2** marks.*

1) Write Fick's law of diffusion and explain the terms.

2) State Colburn analogy between heat, mass and momentum transfer and define the dimensionless groups involved

3) Write the significance of absorption and stripping factor

4) Define wet bulb depression and how it is related to psychrometric ratio

5) Distinguish between humidification and dehumidification

6) Define absolute humidity and dew point.

7) List the factors which affect the zone of unsaturated drying

8) Explain L law of crystal growth

9) Describe Meir's super saturation theory

10) Distinguish between bound and unbound moisture. (10 x2 = 20 marks)

Part B

*Answer **one full** question from each module. Each question carries **20** marks*

Module-1

11) a) derive the equation to calculate the molar flux under steady state diffusion through a stagnant gas

b) Describe the salient features of the penetration theory of mass transfer.

OR

12) Chloroform vapor is diffusing from the surface of the liquid contained in a capillary in to ambient air at 298K and 101.3kPa. The diffusivity of chloroform in air at this condition is 9.5 x $10^{-6}m^2/s$. The vapor pressure of chloroform at 298K is 30Kpa. If the length of diffusion path is 70mm from the surface of the liquid, estimate the rate of steady state diffusion in $Kmol/m^2s$.Also estimate the mole fraction of chloroform halfway along the length of the diffusion path.

Module-II

13) a. Compare packed c columns versus plate columns for gas absorption

b. Derive kremser equation and describe its applications

OR

14) It is decide to absorb 95% of acetone from an acetone air mixture containing 2 percent (mole) acetone in a counter current packed tower. The gas flow rate is 4000 Kg/hm^2pure water is used the solvent at a rate of 7000 Kg/hm^2. The equilibrium solubility of acetone in water is given by $y^* = 2.53\ x$ where x and y are the mole fractions of acetone in the liquid and gas phases respectively. The heights of individual transfer units are 0.32 m and 0.53 m respectively for the liquid phases. Assume dilute solutions and calculate the height of the tower

Module-III

15) Describe with a neat s sketch the types of cooling towers used in process industries.

(b) Derive Lewis relation and explain its significance

OR

16) Air at a temperature of 30^0C and a pressure of 100KPa has a relative humidity of 80%.

a) Calculate the molar humidity of air

b) Calculate molar humidity of air if its is reduced to 15^0C and its pressure is increased to 200KPa, condensing out some water

c) Calculate the weight of water condensed from 100$m^3$of original wet air in cooling to 15^0C and compressing to 200KPa.

Module-IV

17) It takes 9 hours for a porous solid to reduce the moisture content from 45 to 10% when dried in a batch dryer under constant frying conditions. The critical moisture content was found to be 25% and the equilibrium moisture 3%. All moisture contents are on dry basis. Assuming that the rate of drying during the falling rate period is proportional to the free moisture content , how long should it take to dry a sample of the same solid from 35 to 5% under the same drying conditions

OR

18. a)Explain L law of crystal growth

b) 200Kg of 15% and 100Kg of 5%solution of Na_2SO_4 by weight are mixed in crystallizer and crystallization takes place . if 50Kg of $Na_2SO_4.10H_2O$ crystals are formed compute the composition of mother liquor

N·E·A·T
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Certificate ID :1ed8b79dd4d2272b9ecb8669292caff9
Student ID :STU65fef0c171fe21711206593

INTERNSHIP GRADE P

GRADE- O (Outstanding):90-100 | E (Excellent):80-89 | A (Very Good):70-79 | B (Good): 60-69 | C (Fair): 50-59 | D (Average): 40-49 | P (Pass): 30-39 | F (Fail): Below 30