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}m²/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/m²s.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/hm²pure water is used the solvent at a rate of 7000 Kg/hm². 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 30⁰C 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 15⁰C and its pressure is increased to 200KPa, condensing out some water

c) Calculate the weight of water condensed from 100m³of original wet air in cooling to 15⁰C and compressing to 200KPa.

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

Class XII
Home Science (064)
Sample Question Paper 2018-19

Time allowed: 3 Hours   **Max. Marks: 70**

General Instructions:
(i) All questions are compulsory.
(ii) There are in all 25 questions.
(iii) Question nos.1-6 are for 1 mark, to be answered in one or two lines.
(iv) Question nos.7-13 are of 2 marks, to be answered in 10-20 words.
(v) Question nos.14-15 are of 3 marks, to be answered in 20-30 words.
(vi) Question nos.16-21 are of 4 marks, to be answered in 30-50words.
(vii) Question nos.22-25 are of 5 marks, to be answered in 60-100 words.
(viii) Support your answer with suitable examples and figures wherever required.

Section-A

1. Write any two cognitive changes in 16year old boy.   **1**

OR

   Find any two emotional changes in a 15 year old girl.

2. Suggest any two food items for an obese lactating mother   **1**

3. List any two ways of bringing harmony in a dress of a two year old child.   **1**

4. Mention any two advantages of using electric water filter at home.   **1**

5. Identify any two effects of cool colour on the personality of a person.   **1**

OR

   Judge any two qualities in a bed sheet in relation to its durability.

6. Write any two ways of increasing savings.   **1**

Section – B

7. In what four ways you can modify the diet of an adolescent girl.   **2**

OR

   Suggest a low cost lunch for an adolescent boy.

8. Write down two positive and two negative impact of media on the identity of adolescents. **2**

9. Write the full form of DWCRA. What should be the annual income of a family benefitted   **2**
    from DWRCA.

10. Your classmate has started bunking classes because of peer pressure. In what four ways you **2** can help your friend.

OR

"Sex education should be provided in schools". Justify the statement with the help of two reasons.

11. List down four ways in which you can contribute to the various programmes of social **2** welfare and community development of the country after receiving Home Science education?

12. How will you identify a good soap? Give two advantages of washing clothes with soap. **2**

13. Explain the method of applying starch to stiffen cotton saree. **2**

OR

Write four important points to be considered for storing heavy zari suit.

Section – C

14. Instruct your friend who is going to hostel of necessary precautions she should take while **3** laundering her woolen jackets.

15. Write any four advantages of saving money. What two factors your father should consider **3** while choosing a long term scheme?

3

OR

Your uncle wants to invest money in Public Provident Fund. Guide him three advantages and three disadvantages of this scheme.

Section – D

16. Radhika wants to make a weekly expenditure diary. But she does not know the format of **4** the same. Help her in making the format and also explain any four advantages of maintaining record of expenditure.

17. Your sister is going to get married and she wants to buy jewelry and cosmetics for herself. **4** Which two standard marks she should check before buying and also suggest any three buying tips for each, which she should follow.

OR

You mother purchased a double door refrigerator online (internet). She found some problem with the functioning of the refrigerator, Company refused to change it. Explain her the procedure to file a complaint in Consumer Court.

18. What is the optimum temperature for the growth of bacteria? What six guidelines will you **4** give to your food handler for storing food in refrigerator?

19. What do you mean by the term adulteration? Name two adulterant found in spices. What four precautions one should follow while purchasing spices? **4**

OR

Name one adulterant you will found in *besan* flour and *besan burfi* respectively. Write two health hazards of each and what four precautions one should take while buying the food item.

20. Age influence the selection of clothing". Explain with two suitable examples. What four points you will keep in mind while buying *Salwar Kameez* for your grandmother? **4**

21. Sixteen your old Deesha is not taking interest in any class activities and remains isolated. What could be the possible reason for it? Write any three causes and three symptoms of this problem. **4**

Section – E

22. Your father has recently retired from his job. He has started getting angry on small issues frequently. Identify five causes of his anger and suggest five strategies to handle the situation. **5**

23. Mrs. Sharma is the mother of six months old boy. Suggest three ways she can take care of her diet along with appropriate reason. Write down four points she should consider while introducing weaning food to her child. **5**

OR

Educate your pregnant cousin who lives in rural area about the importance of adding proteins and calcium in her diet. How much additional proteins and calcium is required by her? Write two sources of each nutrient.

24. What do you understand by real income? Define its two types and two ways of increasing this income. **5**

25. Write down any two criteria of each to check the quality of Hem, Seam, Placket, Zipper and Pleats in readymade garments. **5**