A   **Reg. No. :** ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

Question Paper Code: 53A02

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Third Semester

Agricultural Engineering

15UAG302 - UNIT OPERATIONS IN AGRICULTURAL PROCESSING

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Energy balances are often complicated because forms of energy can be ___   CO1-R

   (a) Inter connected   (b) Inconvenient   (c) Inter converted   (d) Incorporated

2. A linear relationship exists between the _____ at which two solutions   CO1-R
   exert the same vapour pressure.

   (a) Volumes   (b) Pressure difference   (c) No. of moles   (d) Temperatures

3. A shape factor is defined as _____.   CO1-R

   (a) q/p   (b) D/p   (c) Dq   (d) QP

4. Rate of filtration is defined as _____   CO2 -R

   (a) Resistance / Driving force   (b) Driving force / Resistance

   (c) Driving force / conductance   (d) Conductance / Driving force

5. Which of the following law reported the power requirement for crushing   CO3 -R
   operation?

   (a) Classius   (b) Bond   (c) Kick   (d) Rittinger

6. Roller mills have _____.   CO3 -R

   (a) Pins   (b) Rolled sheets

   (c) Finely fluted rolls   (d) Rolled balls of different Sizes

7. The solvent rich phase is called as _____   CO4 -R

(a) Raffinate   (b) Solute   (c) Solvent   (d) Extract

8. The simple _____ process includes separation of two immiscible liquids.   CO4 -R

(a) Leaching   (b) Expression   (c) Extraction   (d) Sedimentation

9. Concentrations can be expressed in _____ .   CO5- U

(a) Mole fraction   (b) Distillation   (c) Filtration   (d) Crystallisation

10. The simple distillation is effective only when the liquid boiling points differ greatly by _____.   CO5- U

(a) $15^{o}C$ (b) $25^{o}C$ (c) $35^{o}C$ (d) $45^{o}C$

PART – B (5 x 2= 10 Marks)

11. Define the law of conservation of mass and energy.   CO1 - U

12. State stokes law.   CO2 - U

13. Define Rolling efficiency.   CO3 - U

14. List the factors affecting rate of gas absorption in contact equilibrium process.   CO4 - U

15. Differentiate between slow cooling and sublimation.   CO5 - U

PART – C (5 x 16= 80Marks)

16. (a) Explain the process involved in engineering unit operations such as (i) Evaporation   CO1-U   (4)

(ii) Filtration   CO1-U   (4)

(iii) Mechanical drying   CO1-U   (4)

(iv) Concentration by freeze drying   CO1-U   (4)

Or

(b) Explain the types of evaporators with the help an illustration.   CO1-U   (16)

17. (a) Define filtration. Explain the factors affecting filtration with an expression.   CO2-U   (16)

Or

(b) Explain the types of filtration equipment's with neat sketch   CO2-U   (16)

18. (a) Explain the laws regarding the crushing efficiency of agricultural CO3-U (16)
product with an illustration.

Or

(b) Explain about Roller mill, Attrition mill, Hammer mill and Ball CO3-U (16)
mill with the principle, working and labeled diagram.

19. (a) Skim milk is prepared by the removal of some of the fat from CO4-App (16)
whole milk. This skim milk is found to contain 90.5% water, 3.5%
protein, 5.1% carbohydrate, 0.1% fat and 0.8% ash. If the original
milk contained 4.5% fat, Calculate its composition assuming that
fat only was removed to make the skim milk and that there are no
losses in processing.

Or

(b) A solution of common salt in water is prepared by adding 20 kg of CO4-App (16)
salt to 100 kg of water, to make a liquid of density 1323 kg m^{-3}.
Calculate the concentration of salt in this solution as a

(a) weight/weight fraction,

(b) weight/volume fraction,

(c) mole fraction,

(d) molar concentration.

20. (a) Explain crystallization and stage equilibrium CO5-U (16)

Or

(b) Explain the flash, differential distillation and steam distillation CO5-U (16)
with neat sketch.

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