R19

SET - 1

III B. Tech I Semester Supplementary Examinations, Dec/Jan -2022-23
AGRICULTURAL PROCESS ENGINEERING
(Agricultural Engineering)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1 a) What is the criterion for selecting type of material handling equipment in processing plant? With the help of diagrams, write about various parts of belt conveying system used in grain processing industry. [8M]

   b) In a wheat milling experiment it was found that to grind 4.33 mm sized grains to IS sieve no. 35 (0.352 mm opening) the power requirement was 8 kW. Calculate the power requirement for milling of wheat by the same mill to IS sieve no. 15 (0.157 mm opening) using Rittinger's law and Kick's law. The feed rate in both the cases was 200 kg/hr. [7M]

(OR)

2 a) Describe the construction and working of a bucket elevator in the seed processing or rice milling environment. [8M]

   b) Whys the size reduction operation is in-efficient? [7M]
   A food material is milled from particle size of 5 mm to 0.0012 mm using 7 kW motor. What size motor will be required to reduce the same feed particle to product particle size of 0.0005 mm? Assume same feed rate and apply the Rittinger's law.

UNIT-II

3 a) What are the purposes of agitation? Write about three different types of impeller agitators. [8M]

   b) Give the typical proportions for design of standard turbine. Use the diagram to show the various dimensions. [7M]

(OR)

4 a) Why the mixing is so important in food processing? Write about the criteria of mixer effectiveness and mixing index for pastes and powders. [8M]

   b) What are the factors that influence the flow pattern in agitated vessels? How to prevent the swirling in vessels? [7M]

UNIT-III

5. a) With the help of a line diagram, explain the construction and working of air screen grain cleaner. [8M]

    What are the important machine factors that are to be considered in the design of an air screen grain cleaner?

    b) With the help of a neat diagram, explain the working and construction of specific gravity separator. [7M]

(OR)

6. a) What is the "critical speed"? Write about the construction and working of indented cylinder grader. [8M]

    b) In a sieve analysis of corn grits with respect to any particular screen opening the mass fraction of the desired particle size in feed, overflow and underflow streams are 0.47, 0.85 and 0.20, respectively. The feed rate of material on the screen is 10 kg/h. Calculate mass flow rate of overflow stream and overall effectiveness of screen. [7M]

UNIT-IV

7. a) What are the drying curves? Explain the importance of constant rate and falling rate drying periods in drying curve.Also, write about the factors that affect equilibrium moisture content. [8M]

   b) Derive the relationship between wet basis and dry basis moisture contents. With a neat sketch, describe a re-circulatory type batch dryer (RPEC dryer). [7M]

(OR)

8. a) Draw an outlines of a Psychrometric chart and show RH line, dry bulb temperature line, humid volume line, wet bulb temperature, and enthalpy line.
   Also define the following Psychrometric chart terms: dry bulb temperature, wet bulb temperature, dew point temperature, humidity ratio, relative humidity, and specific volume. [8M]

   b) Write about the fluidized bed dryer. [7M]
   If, 2000 kg of paddy is dried from moisture content of 20% w.b. to 12% d.b., calculate the bone dry paddy, moisture evaporated, and final weight of dried product.

UNIT-V

9. a) Explain the wet milling method for producing pigeon-pea dhal. [8M]

   b) What is filtration? With a neat diagram, explain the working of plate and frame filter press. [7M]

(OR)

10. a) What is parboiling? Why parboiling of paddy is done? Write about pressure parboiling method for paddy. [8M]

   b) What are various products and bi-products of what milling? Write about the important steps in wheat milling. [7M]