Course Code: 19AG0707 **R19**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
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QUESTION BANK (DESCRIPTIVE)

Subject with Code: Agricultural Process Engineering(19AG0707) **Course & Branch:** B.Tech-AGE
Year &Sem: III-B.Tech &I-Sem **Regulation:** R19

UNIT – I
PHYSICAL CHARACTERISTICS OF DIFFERENT FOOD GRAINS AND RHEOLOGY

1.	**a.**	Write the classification and importance of Physical & Mechanical properties of biological materials.	[L1][CO2]	**[6M]**
	b.	Give the classification and importance of Thermal and Electrical properties of biological materials.	[L1][CO2]	**[6M]**
2.	**a.**	Explain projected area method for measurement of size with neat sketch.	[L2][CO2]	**[6M]**
	b.	Define specific gravity. List out the methods for determination of specific gravity and explain Specific gravity balance (used for small fruits).	[L1][CO2]	**[6M]**
3.	**a.**	Briefly explain the importance of engineering properties of biomaterial materials.	[L2][CO2]	**[6M]**
	b.	Write the applications of Aero-hydrodynamic, Frictional and Optical properties of biological materials.	[L1][CO2]	**[6M]**
4.	**a.**	Explain roundness, roundness ratio and sphericity with suitable equations and neat sketch.	[L2][CO2]	**[6M]**
	b.	Define bulk density, true density, apparent density with related expressions.	[L1][CO2]	**[6M]**
5.	**a.**	Define porosity. Explain the method for determination of porosity with neat sketch.	[L2][CO2]	**[8M]**
	b.	Tank 2 of the apparatus is filled with a sample of dry shelled corn to a bulk density of 752.86kg/m3. The pressure readings were P1=0.38m and P3=0.26m. Find the porosity of the corn.	[L3][CO2]	**[4M]**
6.	**a.**	Explain the platform scale for measurement of volume, density and specific gravity of large objects with neat sketch.	[L2][CO2]	**[6M]**
	b.	Define surface area. Explain the methods for determination of the surface are of leaf & stalk, fruits & vegetables, Cereals, pulses and oil seeds.	[L2][CO2]	**[6M]**
7.		Explain the possible force-deformation curve for an agricultural product.	[L2][CO2]	**[12M]**
8.		List out the rheological models and derive kelvin model with related equations.	[L4][CO2]	**[12M]**
9.	**a.**	Define rheology. Write the classification, importance and application of rheological properties.	[L1][CO2]	**[8M]**
	b.	Define stress relaxation, retardation time and creep with diagrams.	[L1][CO2]	**[4M]**
10.	**a.**	Explain the Toughness, Resilience and Stiffness with neat sketch.	[L2][CO2]	**[6M]**
	b.	List out and explain the Non Newtonian fluids with graphical representation.	[L2][CO2]	**[6M]**

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UNIT-II
FRICTIONAL, AERODYNAMIC, ELECTRICAL AND THERMAL PROPERTIES

1.	**a.**	Define friction. Explain types of friction and write equation for frictional force with neat sketch.	[L1][CO2]	**[6M]**
	b.	Define coefficient of friction and explain the experimental setup for measurement of it.	[L1][CO2]	**[6M]**
2.	**a.**	Define angle of internal friction and list out the factors effecting frictional force.	[L2][CO2]	**[5M]**
	b.	Explain the Experimental set up for coefficient of internal friction with neat sketch	[L2][CO2]	**[7M]**
3.	**a.**	Explain the method for determination of angle of repose of the food grains with neat sketch.	[L2][CO2]	**[6M]**
	b.	Explain Rolling resistance with neat sketch.	[L2][CO2]	**[6M]**
4.	**a.**	Explain the role of aerodynamic properties in food processing	[L2][CO2]	**[6M]**
	b.	What is a drag coefficient? Draw the forces acting on a body immersed in fluid with suitable equations.	[L3][CO2]	**[6M]**
5.	**a.**	Explain the importance and application of electrical properties in food engineering.	[L2][CO3]	**[6M]**
	b.	Explain electrical conductivity and permittivity with suitable equations.	[L2][CO3]	**[6M]**
6.	**a.**	Define terminal velocity and derive equation for terminal velocity of a particle with neat sketch.	[L3][CO2]	**[8M]**
	b.	Find the terminal velocity of fat particle of 6μm in diameter and density 930 kg/m^3 in skim milk of 1036 kg/m^3 density. The viscosity of the skim milk is 0.00136 kg/ms. How long it will take to cover a distance of 15 cm.	[L3][CO2]	**[4M]**
7.	**a.**	Explain the relationship between conductivity and resistivity of a material with equations.	[L2][CO3]	**[6M]**
	b.	Write about dielectric materials and discuss the importance of dielectric materials food engineering	[L2][CO3]	**[6M]**
8.	**a.**	Explain the importance and application of thermal properties in food engineering.	[L2][CO3]	**[6M]**
	b.	List out thermal properties and define specific heat, thermal conductivity and thermal diffusivity	[L1][CO3]	**[6M]**
9.	**a.**	Explain the power losses due to friction with suitable equation.	[L2][CO2]	**[6M]**
	b.	Assume that corn grain is to be conveyed through a length of 10 feet and up 4 feet at a rate of 10 bushels per minute by means of a drag-chain conveyor. Coefficient of friction of the grain against steel at 7.3% and 19.3% moisture content are respectively 0.46 and 0.56. The grain weighs 61.5 pounds per bushel when dry and 54.7 pounds per bushel when wet. Excluding the power required for running of the empty conveyor, determine the effect of moisture content on horsepower requirement to lift the grain	[L3][CO2]	**[6M]**
10.		Write the application of engineering properties in handling, processing machines and storage structures	[L1][CO1]	**[12M]**

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UNIT-III
THEORY OF SEPARATION

1.	**a.**	Define separation, cleaning, grading, sorting, scalping and screening. .	[L1][CO4]	**[6M]**
	b.	Write the purpose of screen motions and explain the screen fractions and also particle motion with neat sketch.	[L1][CO4]	**[6M]**
2.	**a.**	A screen is used to separate two components (A and B) from a feed where F, O and U are taken as mass flow rates of feed, overflow and underflow streams, respectively. The corresponding mass fraction of the oversize component A in these streams is Mf, Mo and Mu. Derive an expression for overall effectiveness of this screen.	[L3][CO4]	**[6M]**
	b.	During the evaluation of an air screen grain cleaner with two screens the following data were observed. (i) The impurities present in feed were 6.5%, (ii) The impurities present in clean grain were 0.5%, (iii) The outflow of blower contained 0.2% clean seed, (iv) The overflow of 1^{st} screen contained 1% clean seed and (v) The overflow contained 0.5% clean seed. Compute the cleaning efficiency of the cleaner.	[L3][CO4]	**[6M]**
3.	**a.**	Explain working principle specific gravity separator with neat sketch.	[L2][CO4]	**[6M]**
	b.	Explain the pneumatic separation of food grains	[L2][CO4]	**[6M]**
4.	**a.**	Explain Ideal and Actual screens and also explain different types of screens with neat sketch	[L2][CO4]	**[6M]**
	b.	Explain rotary air screen cleaner with neat sketch	[L2][CO4]	**[6M]**
5.	**a.**	Explain the different types of screen openings	[L2][CO4]	**[5M]**
	b.	Enlist and explain the various accessories for improving the efficiency of screen cleaner.	[L2][CO4]	**[7M]**
6.		Explain Design consideration of an air-screen grain cleaner with neat sketch	[L2][CO4]	**[12M]**
7.	**a.**	Explain disk separator with neat sketch.	[L2][CO4]	**[6M]**
	b.	Explain the working principle of indented cylinder separation with neat sketch.	[L2][CO4]	**[6M]**
8.	**a.**	With neat sketch explain working principle of cyclone separator	[L2][CO4]	**[7M]**
	b.	Air carrying particles of density 1200kg/m^3 and an average diameter of 25 micron enters a cyclone of 600 mm diameter at linear velocity of 20 m/s. Calculate the centrifugal force acting radially in the cyclone and the separation factor of the cyclone.	[L3][CO4]	**[5M]**
9.		A cyclone separator having the following specifications is used to collect particles of specific gravity 1.2. Cyclone diameter=180 cm; Air inlet diameter=30 cm; Separating height= 2.5 of dia. Of inlet; Helix pitch=15°; Inlet width=10 cm and Entry particle velocity= 15 m/s. Compute the smallest particle which can be collected. Estimate the pressure drop through the unit.	[L3][CO4]	**[12M]**
10.	**a.**	What are the responsible functions of vibration of screen to increase performance?	[L1][CO4]	**[4M]**
	b.	Explain the working principle of colour separator with neat sketch	[L2][CO4]	**[8M]**

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UNIT-IV

SCOPE AND IMPORTANCE CROP PROCESSING, SIZE REDUCTION

1.	**a.**	Define size reduction, Principles of size reduction and what are the characteristics of comminuted products?	[L1][CO4]	**[6M]**
	b.	Define fineness modules and crushing efficiency with related expression and What are the parameters for evaluation of performance of a size reduction machine?	[L1][CO4]	**[6M]**
2.	**a.**	Explain present status, importance and scope of food processing	[L2][CO4]	**[6M]**
	b.	State Kicks and Rittingers laws for energy requirement with related equations.	[L1][CO4]	**[6M]**
3.	**a.**	Enlist and explain the types of forces used in size reduction equipment's	[L2][CO4]	**[8M]**
	b.	How much power is required to crush 2 t/hr of a material if 80% of the feed passes through IS sieve No. 480 (4.75 mm opening) and 80% of the product passes through IS sieve No. 50 (0.5 mm opening)?. Given the work index of the material as 6.30.	[L3][CO4]	**[4M]**
4.	**a.**	Write the classification of size reduction equipment's.	[L2][CO4]	**[6M]**
	b.	Write the operation ranges of size reduction equipment for solids.	[L1][CO4]	**[6M]**
5.		Explain Jaw crusher and serrated crusher with neat sketch	[L2][CO4]	**[12M]**
6.		Explain gyratory crusher and smooth roll crusher with neat sketch.	[L2][CO4]	**[12M]**
7.		Explain working principle of Hammer mill with neat sketch.	[L2][CO4]	**[12M**
8.	**a.**	Explain working principle of Ball mill with neat sketch.	[L2][CO4]	**[8M**
	b.	What would be the operating speed of rotations per minute of ball mill of 2000 mm diameter charged with 100 mm balls? Ball mill grinding solid matter.	[L3][CO4]	**[4M]**
9.	**a.**	In wheat milling experiment it as found that to grind 4.33mm sized grains to IS sieve 35 (0.351 mm opening). The power requirement was 8 KW, calculate the power requirement foe milling of wheat by the same mill to IS sieve 15 (0.157 mm opening) using 1) Rittingers law 2) Kicks law. Feed rate of milling is 200 kg/hr.	[L3][CO4]	**[8M]**
	b.	State Bonds laws for power requirement with related equation and define work index.	[L1][CO4]	**[4M]**
10.	**a.**	Explain working principle of Attrition mill with neat sketch	[L2][CO4]	**[6M]**
	b.	Explain the energy requirement of size deduction.	[L2][CO4]	**[6M]**

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UNIT-V
RICE MILLING, THEORY OF FILTRATION

1.	**a.**	Explain parboiling. What are the main objectives of paddy parboiling and write the classification of parboiling methods.	[L2][CO5]	**[6M]**
	b.	Write about the effect of parboiling on milling, nutritional and cooking qualities of paddy.	[L1][CO5]	**[6M]**
2.		Explain the flow chart of modern rice mill.	[L2][CO5]	**[12M]**
3.		Explain about rubber roll Sheller with neat sketch.	[L2][CO5]	**[12M]**
4.		Enlist and explain the components of a wheat mill.	[L2][CO5]	**[12M]**
5.		Explain important unit operations in pulse milling.	[L2][CO5]	**[12M]**
6.	**a.**	Write about the importance of oil seed processing.	[L2][CO5]	**[6M]**
	b.	Explain the oil expression and oil extraction.	[L2][CO5]	**[6M]**
7.	**a.**	Define Rate of filtration and write the factors affecting the rate of filtration.	[L1][CO6]	**[4M]**
	b.	Explain constant rate filtration and constant–pressure filtration	[L2][CO6]	**[8M]**
8.	**a.**	Enlist filtration equipment's and write the basic requirements for filtration equipment's.	[L2][CO6]	**[5M]**
	b.	Explain centrifugal filters with neat sketch.	[L2][CO6]	**[7M]**
9.		Explain plate and frame filter press with neat sketch.	[L2][CO6]	**[12M]**
10.	**a.**	Write the advantages and disadvantages of parboiling.	[L1][CO5]	**[6M]**
	b.	Explain CFTRI method of parboiling	[L2][CO5]	**[6M]**

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