Roll No. | | | | | | | | | | |

B.E. / B.Tech. (Full Time) ARREAR EXAMINATIONS, Apr / May 2019

AGRICULTURAL AND IRRIGATION ENGINEERING

Fifth Semester

AI 8505 – UNIT OPERATIONS AND POST HARVEST TECHNOLOGY

(Regulation 2012)

Time: 3 hours Max Marks: 100

Answer ALL Questions

Part – A (10 x 2 = 20 Marks)

1) Write the unit operations as a flow chart for preparing refined sugar.
2) Calculate the HUF and COP of drier, if the temperatures of air entering is 34°C, heated air is 112°C and cooled air is 41°C.
3) Define Kick's law and write the equation to calculate the energy required for size reduction.
4) Write Stoke's law and how is it responsible for sedimentation?
5) 2 tonnes of freshly harvested chilli fruits at a moisture content of 22% wb were dried to a final moisture content of 13% wb in a batch type drier. Determine the dried weight of the product. Verify the same on dry basis also.
6) Differentiate latent heat of fusion and vaporization.
7) What is the principle on which a colour sorter works?
8) Differentiate cross flow and axial flow in threshing.
9) Expand CIPHET and write its role.
10) List the material characteristics to be considered while choosing a handling equipment.

Part – B (5 x 16 = 80 marks)
(Question No.11 is Compulsory)

11) Explain the drying process in detail through drying curve and derive an expression to find out the total time required for thin layer and deep bed drying. (16)

12) a) i) Discuss the size reduction of dry foods and the equipments needed for the same. Draw neat sketches. (12)

ii) A cold storage wall 3.5 m x 6.5 m is constructed of 18 cm thick concrete (thermal conductivity = 1.37 w/m °C). Insulation must be provided to maintain a heat transfer rate through the wall at or below 500 w. If the thermal conductivity of the insulation is 0.04 w/m °C, compute the required thickness of insulation. The outside temperature of the wall is 38 °C and inside wall temperature is 6 °C. (4)

(OR)

b) i) Discuss filtration in detail and the different types of filters required for the same. (8)

ii) Explain the distillation process and the different types of columns in detail (8)

13) a) i) Discuss in detail the various unit operations involved in the post harvest processing of grains. (10)

ii) Determine the values of c and n from Henderson's equation for the following data obtained from thin layer drying of paddy.
a) RH = 30%, t = 50° C, M_e = 10.5% b) RH = 55%, t = 50° C, M_e = 15.5% (6)

(OR)

b) i) Discuss the losses in a food pipeline with respect to Indian scenario. (6)

ii) List the factors responsible for selection of method to determine the moisture content of grains. Explain the destructive methods of determination of moisture. (10)

14) a) i) Explain the features and working of a single scalper drum cleaner with a neat sketch. Also derive the formula for calculating its efficiency. (16)

(OR)

b) i) With a neat sketch, explain the axial flow thresher. Also derive an expression for finding its Performance Index. (16)

15) a) i) A bucket elevator used for lifting paddy has 20 cm long buckets and a cross section of a circle having a radius of 15 cm and subtending an angle of 80° at the centre. The buckets are spaced 40 cm apart. The lift is 25 m and the head wheel has a diameter of 60cm. Calculate the belt speed so that the discharge is positive, capacity of the elevator to lift paddy that weighs 600 kg/m^3 and the HP required to power the elevator assuming the efficiency as 80%. If the same quantity has to be conveyed through a screw conveyor, find out the diameter of the shaft assuming recommended specifications. Assume any relevant data if required. (8)

ii) Briefly explain the various parameters to be evaluated during commercial storage of grains. (8)

(OR)

b) i) Discuss the modern rice mill through a flow chart. (8)

ii) Discuss in detail the points to be considered while constructing a storage godown for grains and its maintenance. (8)