**M.Tech Even Semester (CBCS) Exam., April—2017**

AGRICULTURAL ENGINEERING

( Food Processing Engineering )

**( 2nd Semester )**

Course No. : MAEEL–05

**( Non-Thermal Food Processing Technologies )**

*Full Marks* : 50
*Pass Marks* : 15

*Time* : 2 hours

*Note* : 1. Attempt *any* **five** questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the margin indicate full marks for the questions.

**1.** *(a)* What is non-thermal food processing? Describe the advantages and limitations of non-thermal food processing technologies. 5





*(b)* Discuss isostatic rule and Le Chatelier's principle of high-pressure processing. 5

**2.** *(a)* During pulse electric field treatment of apple juice, a voltage of 65 kV was applied in exponentially decaying form to create electric field strength of 35 kV $cm^{1}$ at ambient temperature. If resistance of the pulse electric field treatment chamber, pulse duration, and the surface area of the electrodes is 50 , 20 *s*, and 0 325 $cm^{2}$, respectively, calculate the gap between the two electrodes. The electric conductivity of the apple juice is 0·2200 S $m^{1}$ at the processing temperature. 5

*(b)* Discuss the applications of high pressure in food processing and preservation. 5

**3.** *(a)* With the help of a neat diagram, describe the high intensity pulsed electric field processing system for non-thermal preservation of food. 5

*(b)* With the help of neat figure, describe the static and continuous treatment chambers of Dunn and Pearlman. 5

**4.** *(a)* Discuss the generation of high intensity magnetic fields for food preservation with a neat figure. 5

*(b)* Explain the working principle of ultrasound in food applications with a figure. 5

**5.** *(a)* With a figure, discuss the variation of pressure and temperature in a non-insulated high-pressure vessel. 5

*(b)* Discuss the selection of pressure transmitting medium in HPP. How the temperature can be controlled during high-pressure treatment of food? 5

**6.** *(a)* Explain electroporation and dielectric rupture theory. 5

*(b)* Discuss the selection of suitable packaging material for non-thermal food processing. 5

**7.** Describe radiation sources and their applications in food preservation. 10





**8.** Write short notes on the following : 2×5=10

*(a)* Hurdle technology

*(b)* Minimally processed food

*(c)* Radicidation

*(d)* Radurization

*(e)* Radappertization

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