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SU/BOS/Sci & Tech/ **No 0 0 3 5 5**

Date : 15/09/2021

To,

**17 SEP 2021**

The Director,  
Departments of Technology,  
Shiva'ji University,  
Kolhapur.

**Subject:** Regarding revised syllabus of **Ph. D. Coursework of Food Technology** under the Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabus of **Ph. D. Coursework of Food Technology** under the Faculty of Science and Technology.

This syllabus will be implemented from the academic year 2020-21 i.e. from June 2020 onwards.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

**Dy. Registrar**

Copy to :-

1.	I/c Dean, Faculty of Science & Technology	2.	Computer Centre/ IT Cell
3.	Chairman, BOS in Architecture	4.	Affiliation Section (U.G./P. G.)
5.	OE 4 Section	6.	P. G. Admission Section
7.	Eligibility Section	8.	P. G. Seminar Section
9.	Appointment Section	10.	P.G. Est.

**Shivaji University Kolhapur**

**Syllabus for Ph D Coursework in**

**Food Technology Engineering**

## **Paper II (Compulsory)**

### **Recent Developments in Food Process Engineering**

**Teaching Scheme:**

**Theory: 4Hrs/ Week**

**Examination Scheme:**

**Theory Examination: 80 Marks**

**Term Work: 20 Marks**

#### **UNIT- I**

Emerging food processing techniques in non-thermal processing: Membrane technology, High hydrostatic pressure (HHP) technique, Ultrasound, Ionizing radiation, Pulsed electric field (PEF) preservation technique, Hurdle technologies etc.

#### **UNIT-II**

Emerging technology in food processing and extraction: Active and Modified Atmosphere Packaging (MAP), Control Atmosphere Packaging (CAP). Supercritical fluid extraction (SCFE): Concept, property of Near Critical Fluids (NCF) and extraction methods (Cold extraction, Microwave assisted extraction), Application of SCFE in food processing.

#### **UNIT-III**

Extrusion cooking: recent developments, methods, equipments, design criteria of extruders, engineering aspects of single and twin screw extrusion cooking, applications of extrusion. Recent trends in freezing systems: frozen food properties, freezing time calculations, slow and fast freezing methods. Refrigeration systems used in food processing and storage.

#### **UNIT- IV**

Novel evaporation/ dehydration techniques: Fluidized bed drying, freeze drying, rotary drying, and vacuum drying. Emerging food processing techniques in thermal processing: Dielectric, ohmic and infrared heating, Ultra high-temperature (UHT)/aseptic processes etc.

Reference:

1. Barbosa-Canovas 2002. Novel Food Processing Technologies. CRC.
2. Dutta AK & Anantheswaran RC.1999. Hand Book of Microwave Technology for Food Applications.
3. Earle, R. L. (2013). Unit operations in food processing. Elsevier.
4. Fellows, P. J. (2009). Food processing technology: principles and practice. Elsevier.
5. Frame ND. (Ed.). 1994. The Technology of Extrusion Cooking. Blackie. Gould GW. 2000. New Methods of Food Preservation. CRC.
6. Geankoplis, C. (1993). Transport Process and Unit Operations, PTR Prentice Hall. Inc.: Englewood Cliffs, NJ, 401.

7. Henderson S. M. and Perry R. L. Agricultural Process Engineering. Avi Publishing Co Inc.; 3rd Revised edition (1976)
8. Jowitt, R. (1984). Extrusion cooking technology.
9. McCabe, W. L., Smith, J. C., & Harriott, P. (1993). Unit operations of chemical engineering (Vol. 5, p. 154). New York: McGraw-hill.
10. Simpson, R. (2009). Engineering aspects of thermal food processing. CRC Press.
11. Singh, R. P., & Heldman, D. R. (2009). Introduction to food engineering. Academic Press
12. Toledo, R. T., Singh, R. K., & Kong, F. (2007). Fundamentals of food process engineering (Vol. 297). New York, NY: Springer.