KHALSA COLLEGE AMRITSAR
-An Autonomous College

Affiliated to Guru Nanak Dev University, Amritsar.

Session: 2021-22

Syllabus : Bachelor of Food Science & Technology [Honours]

Post-Graduate Department of Food Science & Technology

ORDINANCE FOR BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)

1. Eligibility for Admission and duration of the courses

(a) A Candidate who has passed Plus Two (Science) exam. of the Punjab School Education Board / C.B.S.E. / I.C.S.E. with 40% marks.

(b) Any other examination recognized as equivalent to the (a) above by the GNDU (with at least 40% marks in Science group) is eligible to join the course.

2. Scheme of Instructions-Examination

For each examination, every student admitted to the courses under the semester system must be on the rolls of the institution, and shall send his/her admission form and fees for the examination through the Principal/Head of the Institution, accompanied by the following certificates.

a) Of having attended at least 75% of the total number of lectures delivered in each theory and practical course separately. Deficiency in lectures may be condoned as per ordinances of college/University. If in particular semester, a student falls short of attendance in a maximum of two courses, he/she would be permitted to appear in the semester examination of the papers in which he/she fulfils the attendance requirements. The course/s in which the student does not fulfill the minimum attendance requirements, he/she shall not be permitted to appear in the semester examination of such course/s, and shall be declared as having failed in such course/s. A student who is falling short of attendance in maximum two courses, he/she shall be required to attend the minimum number of lectures which were falling short, during next year when the course/s is/are offered.

b) Of having good moral character.

c) The syllabi, courses of reading and regulations for the courses shall be notified by the university from time to time, and shall be deemed to constitute an integral part of ordinances. Course evaluation under the semester system of evaluation shall be done on marks basis. If a course has both the theory and practical components, the student will be required to pass both the components, separately. However, if the student fails in theory, but is passing in practical examination of that course, he/she will be required to clear the theory paper only, and vice-versa.

d) Carry on system for various semester examinations.

I. Courses having eight semester duration:

a. There shall be no condition for promoting a student from first semester to second semester.

b. A student shall be promoted to third semester only if he/she has passed at least 50% courses/papers of the first two semesters, but there will be no condition for promoting a student from third semester to fourth semester.

c. A student shall be promoted to fifth semester only if he/she has passed at least 50% courses/papers of the first four semesters.

d. There shall be no condition for promoting a student from fifth semester to sixth semester.

e. However, the student shall be promoted to sixth semester only if he/she has passed all the papers of the first semesters.

f. After a period of eight semesters, the student shall be given a period of two consecutive years to pass.

Note 1: No special chance or exemption shall be allowed beyond what is stated in the above Ordinances.

Note 2: Failing students shall appear in the examination in the regular semester examinations next year i.e. reappear ofexamination for an odd semester shall be conducted along with the next odd semester, and even semester along with the next even semester and there shall be no special supplementary examinations.

Note 3: If 50% of the courses/papers required to pass involve a fraction, the fraction of the course/paper will be treatedas a full course. For example, if in a year there are 13 courses in two semesters, the candidate will be required to pass minimum of 7 courses/papers.

e) The pass marks for a course (paper) shall be 35% at Bachelor‟s Degree level. Pass marks in aggregate for all the courses shall be 40%. Re-evaluation shall be allowed as per ordinances.

If a candidate obtains less than 40% marks in aggregate at the end of final semester/year of his/her course but is pass in all individual papers, the result of such a candidate shall be declared as „fail‟, and he/she shall be required to improve his/her score in one or more papers in any of the semesters/year so as to obtain a minimum of 40% marks in aggregate to pass the examination.

f) The medium of instructions shall be English.

g) Grace marks will be allowed as per college/University ordinances.

h) Maximum time will be allowed to pass a course is given below

Course duration	Maximum time to complete a degree
Four years	Six years

i) The candidate shall be treated to be failing in the course offered in the semester in which he has not sought admission/dropped the semester and such course/papers in which the candidate has failed shall be taken into account while deciding the promotion of the candidate in subsequent semesters as per the condition. The candidate shall be required to seek admission into the second semester examination as a regular candidate at the end of the prescribed duration of the course, but within the maximum time allowed to pass a course as given under Para (h) of the ordinances, provided that he fulfills all other requirements under the prevailing ordinances. Regular students admitted to a course shall register/enroll themselves with the university in the very first semester of their admission and pay prescribed fee to the college/University. Direct admission to second semester is not allowed.

3. Discipline

Each student shall be under the control and discipline of the concerned institution. In case of any misconduct on the part of a student, the institution shall have a power to take disciplinary action against the defaulter, to the extent of cancellation of admission of the defaulting student from the rolls of the institution.

4. Result-Division-Degree

The successful candidates shall be classified into the following divisions:

a) **First Division with distinction**-Those who obtain 75% or more marks at the end of their course.

b) **First Division**-Those who obtain 60% or more marks at the end of their course.

c) **Second Division**- Those who obtain 50% or more marks, but less than 60% marks at the end of their course.

d) **Third Division**- Those who obtain 40% or more marks, but less than 50% marks at the end of their course.

The successful candidate shall be awarded the degree in the subject of his/her study indicating the divisions obtained on the basis of the result of all the semester examinations. A student who does not complete the programme of study within the minimum duration of the course of his/her study, or fails in any course, shall not be eligible for any merit position/medal/award of the University.

Programme Specific Outcomes (PSO)

PSO1:-To familiarize students with the food components, analytical leadings, instrumentals and various processing techniques used in the processing and preservation of foods.
PSO2:- To make students understand various handling storage, processing, packaging, and entrepreneurship techniques along with the environmental challenges.
PSO3:To enhance the capability of students to identify, analyze and solve to problem arising in food industries in the process of preparation & preservation of foods.
PSO4:- To strengthen the foundation of students to build up their career in food industry or to pursue career in food as well as interdisciplinary areas or to establish their entrepreneurship ventures.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) SEMESTER I-VIII (2021-22)

INDEX - I

25	FST - 405	Food Plant Hygiene and Sanitation	40	20	20	80	25
26	ESL - 222	Environmental Studies – II (Compulsory)	50	-	-	50	26
	SEMESTER-V						
27	FST - 501	Principles of Fermentation Technology	40	20	20	80	27
28	FST - 502	Food Packaging – I	40	20	20	80	28
29	FST - 503	Confectionery & Sugar Technology	40	20	20	80	29
30	FST - 504	Oil & Fat Technology-I	40	20	20	80	30
31	FST - 505	Processing of Milk Products – II	40	20	20	80	31

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) SEMESTER I-VIII (2021-22)

INDEX - II

43	FST - 801	Food Biotechnology	40	20	20	80	43
44	FST - 802	Enzymes In Food Processing	40	20	20	80	44
45	FST - 803	Food Engineering – II	40	20	20	80	45
46	FST - 804	Food Plant Layout	40	20	20	80	46
47	FST - 805	Food Analysis & Instrumentation	40	20	20	80	47

Note:

1. Marks of DA 1 & DA 2and ESL-221 & ESL-222 are not included in the total marks.
2. All the students are required to undergo 'In Plant Training' for 4 weeks in a food processing unit after 6^{th} semester's final examinations. Final degree to the students will be awarded subject to their successfully completing the 'In Plant Training'.
3. In Plant Training will be evaluated as satisfactory / unsatisfactory internally by the department of the college concerned.
4. Last date for submission of training Report within 1 Week after coming from training.

Ist Semester:

Teaching Periods/Marks

Course Code	Course title	Teaching Periods		Marks			Total
		Theory	Practical	Theory	Practical	Int.	
FST – 101	Communication Skills in English	6	-	37	-	13	50
FST – 102	Punjabi Compulsory OR Basic Punjabi (*Mudhli* Punjabi)	6	-	37	-	13	50
FST – 103	Crop Science	3	3	30	15	15	60
FST – 104	Fundamentals of Food Nutrition	3	3	40	20	20	80
FST – 105	Introductory Biochemistry	3	3	40	20	20	80
FST – 106	Principles of Food Preservation	3	3	40	20	20	80
DA -1	Drug Abuse	3	-	50	-	-	50

IInd Semester:

Teaching Periods/Marks

Course Code	Course title	Teaching Periods		Marks			Total
		Theory	Practical	Theory	Practical	Int.	
FST – 201	Communication Skill in English	6	-	37	-	13	50
FST – 202	Punjabi Compulsory OR Basic Punjabi (*Mudhli* Punjabi)	6	-	37	-	13	50
FST – 203	Introduction to Computers	3	3	28	17	15	60

FST – 204	General Microbiology	3	3	40	20	20	80
FST – 205	Food Chemistry	3	3	40	20	20	80
FST – 206	Food Additives	3	0003	40	20	20	80
DA- 2	Drug Abuse	3	-	50	-	-	50

***Note:** Marks of DA-1 & DA -2 are not included in the Total Marks.

IIIrd Semester:

Teaching Periods/Marks

Course Code	Course title	Teaching Periods		Marks			Total
		Theory	Practical	Theory	Practical	Int.	
FST – 301	Food Microbiology	3	3	40	20	20	80
FST – 302	Fluid Milk Processing	3	3	40	20	20	80
FST – 303	Processing of Meat and Meat Products	3	3	40	20	20	80
FST – 304	Post Harvest Management of Fruits and Vegetables	3	3	40	20	20	80
FST – 305	Cereal Milling and Legumes	3	3	40	20	20	80
ESL – 221*	Environmental Studies – I (Compulsory)	1.5	-	50	-	-	50

IVth Semester:

Teaching Periods/Marks

Course Code	Course title	Teaching Periods		Marks			Total
		Theory	Practical	Theory	Practical	Int.	
FST – 401	Processing of Milk Products-I	3	3	40	20	20	80
FST – 402	Egg, Poultry and Fish Technology	3	3	40	20	20	80
FST – 403	Fruits and Vegetables Processing	3	3	40	20	20	80
FST – 404	Processing of Cereals and Legumes	3	3	40	20	20	80

FST – 405	Food Plant Hygiene and Sanitation	3	3	40	20	20	80
ESL – 222*	Environmental Studies – II (Compulsory)	1.5	-	50	-	-	50

***Note:** Marks of ESL-221 & ESL-222 are not included in the Total Marks.

Vth Semester:

Teaching Periods/Marks

Course Code	Course title	Teaching Periods		Marks			Total
		Theory	Practical	Theory	Practical	Int.	
FST – 501	Principles of Fermentation Technology	3	3	40	20	20	80
FST – 502	Food Packaging-I	3	3	40	20	20	80
FST – 503	Confectionery & Sugar Technology	3	3	40	20	20	80
FST – 504	Oil & Fat Technology - I	3	3	40	20	20	80
FST – 505	Processing of Milk Products-II	3	3	40	20	20	80

VIth Semester :

Teaching Periods/Marks

Course Code	Course title	Teaching Periods		Marks			Total
		Theory	Practical	Theory	Practical	Int.	
FST – 601	Quality Assurance	3	3	40	20	20	80
FST – 602	Grain Storage	3	3	40	20	20	80
FST – 603	Food Packaging-II	3	3	40	20	20	80
FST – 604	Spices & Flavour Technology	3	3	40	20	20	80
FST – 605	Technology of Fermented Foods	3	3	40	20	20	80
FST – 606	In Plant Training 4 weeks	-	-	-	-		S/US

Last date for submission of Training Report: within 1 week after coming from training.

Note: All the students are required to undergo „In Plant Training" for 4 weeks in a food processing unit after VIth semester"s final examinations. Final degree to the students will be awarded subject to their successfully completing the „In Plant Training". In Plant Training will be evaluated as satisfactory / unsatisfactory internally by the department of the college concerned.

VIIth Semester

Teaching Periods/Marks

Course Code	Course title	Teaching Periods		Marks			Total
		Theory	Practical	Th.	Prt.	Int.	
FST – 701	Food Safety & Food Laws	3	3	40	20	20	80
FST – 702	Industrial Microbiology	3	3	40	20	20	80
FST – 703	Oil & Fat Technology – II	3	3	40	20	20	80
FST – 704	Food Engineering – I	3	3	40	20	20	80
FST – 705	Malting & Brewing Technology	3	3	40	20	20	80

VIIIth Semester
Teaching Periods/Marks

Course Code	Course title	Teaching Periods		Marks			Total
		Theory	Practical	Th.	Prt.	Int.	
FST – 801	Food Biotechnology	3	3	40	20	20	80
FST – 802	Enzymes in Food Processing	3	3	40	20	20	80
FST – 803	Food Engineering – II	3	3	40	20	20	80
FST – 804	Food Plant Layout	3	3	40	20	20	80
FST – 805	Food Analysis & Instrumentation	3	3	40	20	20	80

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER – I
COURSE CODE: FST-101
COURSE TITLE: COMMUNICATION SKILLS IN ENGLISH)
BCA/B.Sc IT/ Bio Tech/BFST/BJMC/B.Sc(Fashion Designing)/B.Mm /BIMT

CREDITS (per week):06
Time: 3 Hours **Max. Marks: 50**
Theory Marks: 37
Internal Assessment: 13

Instructions for Paper Setters:
The question paper will consist of Seven skill–oriented questions from Reading and Writing Skills. The first 6 Questions carry 5 marks each. The 7th Question carries 7 marks. The questions shall be phrased in a manner that students know clearly what is expected of them. There will be internal choice wherever possible.

- **i)** Comprehension questions of an unseen passage.
- **ii)** Personal letter Official/Business letters.
- **iii)** Writing notices/agenda/resolution/ minutes for public circulation on topics of professional interest
- **iv)** Writing resume or converting a biographical note into resume
- **v)** Writing news report based on a given heading
- **vi)** Do as directed
  Articles Units 69-81
  Conjunctions Units 113-120 (6X5=30 Marks)
- **vii)** Translation from English to Vernacular (Punjabi/ Hindi) (Isolated Sentences) (1X7=7 Marks)

Course Objectives
Students will be able to use English language as a tool to express themselves by practicising engligh in reading, writing and speaking. This will build confidence in them to face world in a better way both at professional and personal way.

Course Contents:
1. Reading Skills: Reading tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings; Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.
Activities:

a) Active reading of passages on general topics
b) Reading newspaper, articles, editorials etc.
c) Short questions based on content and development of ideas of a given paragraph.

2. Writing Skills: Guidelines for effective writing; writing styles for application, resume, personal letter, official/ business letter, memo, notices etc.
Activities:

a) Personal and business letters.
b) Converting a biographical note into a sequenced resume.
c) Writing notices for circulation/ boards.
d) Making notes of given passage with headings and sub-headings
e) Writing newspaper reports based on given heading.

Prescribed Book:
Murphy's English Grammar (by Raymond Murphy) CUP

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *The Written Word* by Vandana R Singh, Oxford University Press

Course Outcome:
CO1: Students will strengthen their reading skils
CO2: Students will practice their expression thorugh reading and writing
CO3: Students will work on their grammer for better expression
CO4: This course will help them throughout their life for expressing themselves in English language

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER – I
B.Sc. (Hons. – Physics, Chemistry, Mathematics),
B.Sc. Bio-Tech./IT/Fashion Designing/Food Sc./BCA, BA-JMC

B.Sc. (Hons. – Physics, Chemistry, Mathematics),
B.Sc. Bio-Tech./IT/Fashion Designing/Food Sc./BCA, BA-JMC/ B.Sc. in Computational Statistics and Data Analytics, B.Voc.(Software Development, Theatre and Stage Craft, Food Processing, Textile Design & Apparel Technology)

SEMESTER-I

ਲਾਜ਼ਮੀ ਪੰਜਾਬੀ

ਸਮਾਂ : 3 ਘੰਟੇ

ਥਿਊਰੀ ਅੰਕ : 37
ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ : 13
ਕੁੱਲ ਅੰਕ : 50

ਪਾਠ-ਕ੍ਰਮ

ਭਾਗ-ਪਹਿਲਾ

ਸਾਹਿਤ ਦੇ ਰੰਗ (ਭਾਗ ਪਹਿਲਾ -ਕਵਿਤਾ ਅਤੇ ਕਹਾਣੀ)
ਡਾ. ਮਹਿਲ ਸਿੰਘ (ਸੰਪਾ.), ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
(ਲੇਖਕ ਦਾ ਜੀਵਨ ਅਤੇ ਰਚਨਾ/ਸਾਰ/ਵਿਸ਼ਾ-ਵਸਤੂ)

ਭਾਗ-ਦੂਜਾ

ਇਤਿਹਾਸਿਕ ਯਾਦਾਂ
ਸ. ਸ. ਅਮੋਲ (ਸੰਪਾ.), ਪੰਜਾਬੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
(ਨਿਬੰਧ 1 ਤੋਂ 6 ਤਕ ਸਾਰ/ ਵਿਸ਼ਾ-ਵਸਤੂ/ਸ਼ੈਲੀ)

ਭਾਗ-ਤੀਜਾ

(ੳ) ਪੈਰ੍ਹਾ ਰਚਨਾ (ਤਿੰਨਾਂ ਵਿਚੋਂ ਇਕ)
(ਅ) ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ

ਭਾਗ-ਚੌਥਾ

(ੳ) ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ : ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪ-ਭਾਸ਼ਾ ਵਿਚਲਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪ-ਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ
(ਅ) ਪੰਜਾਬੀ ਭਾਸ਼ਾ - ਨਿਕਾਸ ਤੇ ਵਿਕਾਸ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪ੍ਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਸਿਲੇਬਸ ਦੇ ਚਾਰ ਭਾਗ ਹਨ ਪਰ ਪ੍ਰਸ਼ਨ-ਪੱਤਰ ਦੇ ਪੰਜ ਭਾਗ ਹੋਣਗੇ।
2. ਪਹਿਲੇ ਚਾਰ ਭਾਗਾਂ ਵਿਚ 02-02 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰੇਕ ਭਾਗ ਵਿਚੋਂ 01-01 ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੋਵੇਗਾ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ (08) ਅੰਕ ਹੋਣਗੇ।
3. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਪੰਜਵੇਂ ਭਾਗ ਵਿਚ ਸਾਰੇ ਸਿਲੇਬਸ ਵਿਚੋਂ 01-01 ਅੰਕ ਦੇ ਛੇ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ 05 ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ ਦੇਣਾ ਲਾਜ਼ਮੀ ਹੋਵੇਗਾ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਨੋਟ : ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 13 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵੱਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁੱਲ ਅੰਕ 37+13 = 50 ਹਨ।

B.Sc. (Hons. – Physics, Chemistry, Mathematics),

B.Sc. Bio-Tech./IT/Fashion Designing/Food Sc./BCA, BA-JMC/ B.Sc. in Computational Statistics and Data Analytics, B.Voc. (Software Development, Theatre and Stage Craft, Food Processing, Textile Design & Apparel Technology)

SEMESTER-I

ਮੁੱਢਲੀ ਪੰਜਾਬੀ

(In Lieu of Compulsory Punjabi)

ਸਮਾਂ : 3 ਘੰਟੇ

ਥਿਊਰੀ ਅੰਕ : 37
ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ : 13
ਕੁੱਲ ਅੰਕ : 50

ਪਾਠ-ਕ੍ਰਮ

ਭਾਗ-ਪਹਿਲਾ

ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੇ ਗੁਰਮੁਖੀ ਲਿਪੀ :

(ੳ) ਨਾਮਕਰਣ ਤੇ ਸੰਖੇਪ ਜਾਣ-ਪਛਾਣ : ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ, ਅੱਖਰ ਕ੍ਰਮ, ਸਵਰ ਵਾਹਕ (ੳ, ਅ, ੲ), ਲਗਾਂ-ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ

(ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ

ਭਾਗ-ਦੂਜਾ

ਗੁਰਮੁਖੀ ਆਰਥੋਗਰਾਫੀ ਅਤੇ ਉਚਾਰਨ :

ਸਵਰ, ਵਿਅੰਜਨ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ ਅਤੇ ਉਚਾਰਣ, ਮੁਹਾਰਨੀ, ਲਗਾਂ-ਮਾਤਰਾਂ ਦੀ ਪਛਾਣ

ਭਾਗ-ਤੀਜਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਜੋੜ :

ਮੁਕਤਾ (ਦੋ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਤਿੰਨ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ), ਸਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਬਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਔਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲੈਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਲਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲਾਵਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਹੋੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਕਨੌੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) ਵਾਲੇ ਸ਼ਬਦ

ਭਾਗ-ਚੌਥਾ

ਸ਼ੁੱਧ-ਅਸ਼ੁੱਧ ਸ਼ਬਦ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪ੍ਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪਹਿਲੇ ਭਾਗ ਵਿਚੋਂ ਚਾਰ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਉੱਤਰ ਦੇਣਾ ਲਾਜ਼ਮੀ ਹੈ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਚਾਰ-ਚਾਰ ਅੰਕ ਹਨ। **(3x4)=12 ਅੰਕ**
2. ਭਾਗ ਦੂਸਰਾ ਵਿਚੋਂ ਦੋ-ਦੋ ਅੰਕ ਦੇ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ। **(5x2)=10 ਅੰਕ**
3. ਭਾਗ ਤੀਸਰਾ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹਨ। ਇਨ੍ਹਾਂ ਦੇ ਪੰਜ-ਪੰਜ ਅੰਕ ਹਨ। **(2x5)=10 ਅੰਕ**
4. ਭਾਗ ਚੌਥਾ ਵਿਚ ਪੰਜ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਕੇ ਲਿਖਣਾ ਹੋਵੇਗਾ। **(5x1)=05 ਅੰਕ**

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 13 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵੱਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 37+13 = 50 ਹਨ।

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –I
COURSE CODE: FST-103
COURSE TITLE: CROP SCIENCE

CREDIT (per week): 03
Time: 3 Hours **Max. Marks: 60**
Theory Marks: 30
Practical Marks: 15
Internal Assessment: 15

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Student will get awareness about various food crops, their growing climatic conditions, cultural practices, various fertilizers required w.r.t different crops. Propagation methods of various fruits and vegetables, their handling techniques.

Course contents:

Theory: **UNIT-I**

Classification of crops, Study of the following crops with particular reference to climatic and soil requirements, their improved cultural practices with special emphasis on seed bed preparation, improved varieties, rotations, seed and seed treatment, sowing, manures and fertilizers, irrigation requirements, weed control, harvesting and marketing.

Cereal crops : Paddy, Maize, Wheat

Pulses : Green gram, Black gram, Bengal gram and Soyabean.

UNIT-II

Oilseeds : Groundnut, Sunflower and Mustard.

Vegetables : Egg plant (Brinjal), Tomato, Ladyfinger, Peas, Cauliflower, Cabbage, Carrot, Potato.

UNIT-III

Horticultural Crops : Study of fruits with special emphasis on selection of site and soil, their culturalpractices with particular reference to training, pruning, propagation methods, harvesting and fruit handling of Mango, Papaya and Kinnow.

Practicals:

Identification of crops, vegetables and fruits studied. Identification and composition of fertilizers and computation of doses of different fertilizers for different crops. Identification and collection of weeds associated with crops studied.

Recommended Books:

1. Package of practices for cultivation of fruits and vegetables.
2. Package of practices for crops of Punjab :Rabi and Kharif.

Course Outcome:

CO1: Know about classification of major crop plants.

CO2: Evaluate and adapt various practices in the production of different food crops.

CO3: Understand the role of various factors affecting growth of farm produce.

CO4: Learn about horticultural practices involved in food crops.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)-Semester-I
COURSE CODE: FST-104
COURSE TITLE: FUNDAMENTALS OF FOOD NUTRITION

CREDITS (per week): 03
Time: 3 Hours **Max. Marks: 80**
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course objectives:

Students will be aware of nutritional aspect of food, their importance for body, Energy calculations depending on one's physical activity, Concept of balanced diet, Impact of malnutrition on infants and elderly, Metabolic rate calculations, RDA requirement at various phases of life, alternative food choices, using food as medicine, planning of diet for various diseased patients.

Course Contents:

UNIT I

Theory:

Definition, Scope & History of Nutrition.
Functions of Food, Food types and groups, Water Balance & Energy Balance.
Energy value of Carbohydrates, Fats & Proteins.
BMI & BMR of an individual.
Balanced diet, Protein and carbohydrate malnutrition.

UNIT II

Recommended daily allowances and requirement of infants, children, adults, old people, Athletes, Expectant and nursing mothers.
Diet surveys& Diet groups, Food Exchange List.

UNIT III

Importance of therapeutic nutrition, Deficiency diseases and disorders of metabolism.

Planning of diets for patients suffering from Ulcer, Anemia, Diarrhea, Diabetes, and Cardiac diseases, Jaundice, Nephritis and Tuberculosis.

Practicals:

1. Identification of food sources for various nutrients.
2. Instruction to diet planning using food exchange list.
3. Calculation of BMI & BMR.
4. Evaluation of own diet.
5. Planning of diet for children, adult and old people.
6. Planning of diet for patient suffering from Ulcer, Anemia, Diabetes, Diarrhea and Cardiac diseases.

Recommended Book:

Food Nutrition: M. Swami Nathan Vol. I, II.

Course Outcome: On completing the course, the students will be able to:

CO1: Understand nutrition and use that knowledge to improve health.
CO2: Learn the nutrient needs of people belonging to socially, economically and culturally diverse environment.
CO3: Learn the use of food as medicine for better health
CO4: Design diet plans for various health conditions.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –I
COURSE CODE: FST-105
COURSE TITLE: INTRODUCTORY BIOCHEMISTRY

CREDITS (per week): 03
Time: 3 Hours **Max. Marks: 80**
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.
Course Objectives:
Course Contents:
Students will be aware of nutritional aspect of food, their importance for body, Energy calculations depending on ones physical activity, Concept of balanced diet, Impact of malnutrition on infants and elderly, Metabolic rate calculations, RDA requirement at various phases of life, alternative food choices, using food as medicine, planning of diet for various diseased patients.
Theory:

UNIT I

General introduction and importance of Biochemistry.Different nutrients of food.

Carbohydrates - Introduction, sources, classification, structure and biochemical functions, metabolicpathways (glycol sis, TCA and HMP) of carbohydrates, Lactic acid and alcoholic fermentation.

Proteins - Introduction, classification, sources, structural organization and biochemical functions,amino acids and their importance.

UNIT II

Lipids - Introduction, classification, sources, structure and biochemical functions, a brief introduction to fatty acids, oxidation of fatty acids.

Vitamins - Introduction, sources and biochemical functions, daily requirements & deficiency diseasesof fat and water soluble vitamins.

UNIT III

Minerals - Introduction, classification as major and minor elements, sources, biochemical functions, daily requirements & deficiency diseases of Ca, Fe, I, P, Na, K, F & Zn.
Digestion and Absorption of carbohydrates, proteins and lipids.
Practicals:

1. Preparation of standard solutions of acid and alkali.
2. Determination of pH using indicators and with pH meter.
3. Determination of moisture in a given sample.
4. Determination of ash in a given sample.
5. Determination of acidity in a given sample.
6. Estimation of fat by sox let method.
7. Estimation of free fatty acid of given sample.
8. Determination of total solids in the given food product.
9. Determination of crude fiber in the given food.

Books Recommended:

1. Principles of Biochemistry by Lehinger AL, 1995, CBS Publisher, New Delhi.
2. Text Book of Biochemistry by Rama Rao AVSS, 1999, LK and S Publishers,Visakhapatnam, Indian.
3. Laboratory Manual in Biochemistry by Jay Raman J, 1996, New Age International Ltd. New Delhi.
4. Principles of Biochemistry by M S Batra and Manbir Singh Principles of Biochemistry. 1st Edition. Ane Books Pvt. Ltd.

Course Outcome :On completing the course, the students will be able to:
CO1: Know about importance of Biochemistry
CO2: Learn different strructrural properties of food components
CO3: Understand metabolism of major food components
CO4: Know about daily requirements and deficiency diseases

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –I
COURSE CODE: FST-106
COURSE TITLE: PRINCIPLES OF FOOD PRESERVATION

Time: 3 Hours

CREC CREDIT (per week):03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.
Course Objectives:
Course Contents:
Tells about importance of food preservation, Technology involved in preservation, various factors affecting the spoilage and how can we prolong the shelf life of food by implementing those techniques.
Theory:

UNIT-I

Introduction: Historical developments of food preservation. Principles of Food preservation.Scope andbenefit of food preservation.Causes of food spoilage.

Preservation by Heat: Heat resistance of microorganisms and their spores. Thermal death time, Heattreatments – boiling, steam under pressure, pasteurization, canning, Aseptic processing.
Preservation by Low Temperature: Low temperature storage, refrigeration and freezing.

UNIT-II

Preservation by Drying: Methods of drying–dehydration by Air drying, sun drying and freeze Drying.
Preservation by Concentration Methods, Intermediate moisture foods.

UNIT-III

Microwave Heating: Properties, mechanism, microwave generator and microwave food application. **Preservation by Radiations:** Ultraviolet and ionizing irradiations. Their effect on microorganisms, use inthe treatment of food.

Practicals:

1. Adequacy of blanching.
2. Dehydration of foods.
3. Preservation of food products by low temperature.
4. Preservation of food products by concentration method.
5. Use of chemicals in preservation of foods.
6. Cut out examination of canned foods.
7. Visit to food industry.

Books Recommended:

1. Food Microbiology by Frazier WC and West Hoff DC, 1988, Tata McGraw Hill Publishers, New Delhi.
2. Food Science by Potter NN, 2006, CBS Publishers, New Delhi.
3. The Technology of Food Preservation by Desrosier & Desrosoier

Course Outcomes: :On completing the course, the students will be able to:
CO1: Learn the techniques and principles involved in food preservation.
CO2: Know about various methods of preservation.
CO3: Learn about different techniques involved in food preservation
CO4: Understand non-thermal methods of food preservation.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –I
COURSE CODE: DA1
COURSE TITLE: Drug Abuse: Problem, Management and Prevention PROBLEM OF DRUG ABUSE

CREDITS (per week): 03
Time: 3 Hours **Max. Marks: 50**

Instructions for the Paper Setters:
Section–A: (15 Marks): It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying 05 marks. Answer to any of the questions should not exceed two pages.
Section–B: (20 Marks) It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying 10 marks. Answer to any of the questions should not exceed four pages.
Section–C: (15 Marks) It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages.

Course Objectives:
Create awareness among students about drugs and repel them from taking drugs by telling them their harmful impact on socio-economic, financial and professional front.

Course Contents:

UNIT–I

- **Meaning of Drug Abuse**

Meaning, Nature and Extent of Drug Abuse in India and Punjab.

UNIT-II

- **Consequences of Drug Abuse for:**

Individual : Education, Employment, Income.

Family : Violence.

Society : Crime.

Nation : Law and Order problem.

UNIT-III

- **Management of Drug Abuse**

Medical Management: Medication for treatment and to reduce withdrawal effects.

UNIT-IV

- Psychiatric Management: Counseling, Behavioral and Cognitive therapy.
- Social Management: Family, Group therapy and Environmental Intervention.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –I
COURSE CODE: DA1
COURSE TITLE: Drug Abuse: Problem, Management and Prevention PROBLEM OF DRUG ABUSE

References:

1. Ahuja, Ram (2003), Social Problems in India, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. The Drug Crime Connection. Beverly Hills: Sage Publications. 23
4. Jasjit Kaur Randhawa & Samreet Randhawa, "Drug Abuse-Problem, Management & Prevention", KLS, ISBN No. 978-81-936570-6-5, (2018).
5. Jasjit Kaur Randhawa & Samreet Randhawa, "Drug Abuse Problem, Management & Prevention", KLS, ISBN No. 978-81-936570-8-9, (2019).
6. Jasjit Kaur Randhawa & Samreet Randhawa, "voZrI d[otos'A^(BPky'oh) ;wZf;nk, gqpzXB ns/o'eEkw", KLS, ISBN No. 978-81-936570-7-1, (2018).
7. Jasjit Kaur Randhawa, "Drug Abuse -Management & Prevention", KLS, ISBN No. 978-93-81278-80-2, (2018).
8 .Kapoor. T. (1985) Drug epidemic among Indian Youth, New Delhi: Mittal Pub.
9. Modi, Ishwar and Modi, Shalini (1997) Drugs: Addiction and Prevention, Jaipur: Rawat Publication.
10. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
11. Rama Gandotra & Jasjit Kaur Randhawa, "voZrI d[otos'A^(BPky'oh) gqpzXB ns/ o'eEkw", KLS, ISBN No. 978-93-81278-87-1, (2018).
12. Sain, Bhim 1991, Drug Addiction Alcoholism, Smoking obscenity New Delhi: Mittal Publications.
13. Sandhu, Ranvinder Singh, 2009, Drug Addiction in Punjab: A Sociological Study. Amritsar: Guru Nanak Dev University.
14. Singh, Chandra Paul 2000. Alcohol and Dependence among Industrial Workers: Delhi: Shipra.
15. Sussman, S and Ames, S.L. (2008). Drug Abuse: Concepts, Prevention and Cessation,
16. World Drug Report 2010, United Nations office of Drug and Crime.
17. World Drug Report 2011, United Nations office of Drug and Crime.

Course outcome: :On completing the course, the students will be able to:
CO1: To create awareness among the students about prevailing abuses in society
CO2: How drugs affect all aspects of life
CO3: How medical field help to manage drug abuse
CO4: Role of psychiatry and society in managing the abuse.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –II
COURSE CODE: FST-201
COURSE TITLE: COMMUNICATION SKILLS IN ENGLISH
BCA/B.Sc IT/ Bio Tech/ BFST/BJMC/B.Sc(Fashion Designing)/ B.Mm /BIMT

CREDITS (per week): 06
Time: 3 Hours **Max. Marks: 50**
Theory Marks: 37
Internal Assessment: 13

Instructions for Paper Setters:
The question paper will consist of Seven skill–oriented questions from Listening and Speaking Skills. The first 6 Questions carry 5 marks each. The 7th Question carries 7 marks. The questions shall be phrased in a manner that students know clearly what is expected of them. There will be internal choice wherever possible.

i) Making summary/ précis or paraphrasing of an idea of a given passage.
ii) Writing a paragraph of expository or argumentative nature of a given topic.
iii) Interpretation of a given data, chart, diagram etc and making a brief report.
iv) Transcoding (given dialogue to a prose or given prose to dialogue).
v) Draft an Advertisement for a given Product and E-mail Writing.
vi) Do as directed Change of voice Units 42-46 (6X5= 30Marks)
vii) Translation from Vernacular (Punjabi/ Hindi) to English (Isolated Sentences) (1X7 = 7Marks)

Course Objectives
This course will make students efficient enough to master English language and use it for conversation on daily basis.

Course Contents:
1. **Listening Skills:** Barriers to listening; effective listening skills; feedback skills, attending telephone calls; note taking.
   Activities:
   a) Listening exercises – Listening to conversation, speech/ lecture and taking notes.
2. **Speaking and Conversational Skills**: Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech; asking and providing information on general topics, situation based Conversation in English; essentials of Spoken English
   Activities:

a) Conversation; dialogue and speech
b) Oral description or explanation of a common object, situation or concept.
c) Interviews and group discussion

Prescribed Book:
Murphy's English Grammar (by Raymond Murphy) CUP

Recommended Books:
1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *The Written Word* by Vandana R Singh, Oxford University Press

Course Outcome:On completing the course, the students will be able to:
CO1: Students will strengthen their different communication skils
CO2: Students will implement their english learning in real life
CO3: Students will work on their grammatical mistakes during listening and speaking.
CO4: This course will help them throughout their life for expressing themselves in English language

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –II
B.Sc. (Hons. – Physics, Chemistry, Mathematics),
B.Sc. Bio-Tech./IT/Fashion Designing/Food Sc./BCA, BA-JMC

B.Sc. (Hons. – Physics, Chemistry, Mathematics),

B.Sc. Bio-Tech./IT/Fashion Designing/Food Sc./BCA, BA-JMC/ B.Sc. in Computational Statistics and Data Analytics, B.Voc. (Software Development, Theatre and Stage Craft, Food Processing, Textile Design & Apparel Technology)

SEMESTER-I

ਮੁੱਢਲੀ ਪੰਜਾਬੀ

(In Lieu of Compulsory Punjabi)

ਸਮਾਂ : 3 ਘੰਟੇ

ਥਿਊਰੀ ਅੰਕ : 37
ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ : 13
ਕੁੱਲ ਅੰਕ : 50

ਪਾਠ-ਕ੍ਰਮ

ਭਾਗ–ਪਹਿਲਾ

ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੇ ਗੁਰਮੁਖੀ ਲਿਪੀ :

(ੳ) ਨਾਮਕਰਣ ਤੇ ਸੰਖੇਪ ਜਾਣ-ਪਛਾਣ : ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ, ਅੱਖਰ ਕ੍ਰਮ, ਸਵਰ ਵਾਹਕ (ੳ, ਅ, ੲ), ਲਗਾਂ-ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ

(ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ

ਭਾਗ–ਦੂਜਾ

ਗੁਰਮੁਖੀ ਆਰਥੋਗਰਾਫੀ ਅਤੇ ਉਚਾਰਨ :

ਸਵਰ, ਵਿਅੰਜਨ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ ਅਤੇ ਉਚਾਰਣ, ਮੁਹਾਰਨੀ, ਲਗਾਂ-ਮਾਤਰਾਂ ਦੀ ਪਛਾਣ

ਭਾਗ–ਤੀਜਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਜੋੜ :

ਮੁਕਤਾ (ਦੋ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਤਿੰਨ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ), ਸਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਬਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਔਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲੈਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਲਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲਾਵਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਹੋੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਕਨੌੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) ਵਾਲੇ ਸ਼ਬਦ

ਭਾਗ–ਚੌਥਾ

ਸ਼ੁੱਧ-ਅਸ਼ੁੱਧ ਸ਼ਬਦ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪ੍ਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪਹਿਲੇ ਭਾਗ ਵਿਚੋਂ ਚਾਰ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਉੱਤਰ ਦੇਣਾ ਲਾਜ਼ਮੀ ਹੈ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਚਾਰ-ਚਾਰ ਅੰਕ ਹਨ। **(3x4)=12 ਅੰਕ**
2. ਭਾਗ ਦੂਸਰਾ ਵਿਚੋਂ ਦੋ-ਦੋ ਅੰਕ ਦੇ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ। **(5x2)=10 ਅੰਕ**
3. ਭਾਗ ਤੀਸਰਾ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹਨ। ਇਨ੍ਹਾਂ ਦੇ ਪੰਜ-ਪੰਜ ਅੰਕ ਹਨ। **(2x5)=10 ਅੰਕ**
4. ਭਾਗ ਚੌਥਾ ਵਿਚ ਪੰਜ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਕੇ ਲਿਖਣਾ ਹੋਵੇਗਾ। **(5x1)=05 ਅੰਕ**

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 13 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵੱਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 37+13 = 50 ਹਨ।

B.Sc. (Hons. – Physics, Chemistry, Mathematics), B.Sc. Bio-Tech./IT/Fashion Designing/Food Sc./BCA, BA-JMC/ B.Sc. in Computational Statistics and Data Analytics, B.Voc. (Software Development, Theatre and Stage Craft, Food Processing, Textile Design & Apparel Technology)

SEMESTER-II

ਮੁੱਢਲੀ ਪੰਜਾਬੀ

(In Lieu of Compulsory Punjabi)

ਸਮਾਂ : 3 ਘੰਟੇ

ਥਿਊਰੀ ਅੰਕ : 37
ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ : 13
ਕੁੱਲ ਅੰਕ : 50

ਪਾਠ-ਕ੍ਰਮ

ਭਾਗ-ਪਹਿਲਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ :

ਧਾਤੂ, ਵਧੇਤਰ (ਅਗੇਤਰ, ਮਧੇਤਰ, ਪਿਛੇਤਰ), ਪੰਜਾਬੀ ਕੋਸ਼ਗਤ ਸ਼ਬਦ ਅਤੇ ਵਿਆਕਰਨਕ ਸ਼ਬਦ

ਭਾਗ-ਦੂਜਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਪ੍ਰਕਾਰ :

(ੳ) ਸੰਯੁਕਤ ਸ਼ਬਦ, ਸਮਾਸੀ ਸ਼ਬਦ, ਦੋਜਾਤੀ ਸ਼ਬਦ, ਦੋਹਰੇ/ਦੁਹਰੁਕਤੀ ਸ਼ਬਦ ਅਤੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦ।

(ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ

ਭਾਗ-ਤੀਜਾ

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਰਚਨਾ :

ਇਕ-ਵਚਨ/ਬਹੁ-ਵਚਨ, ਲਿੰਗ-ਪੁਲਿੰਗ, ਬਹੁਅਰਥਕ ਸ਼ਬਦ, ਸਮਾਨਅਰਥਕ ਸ਼ਬਦ, ਬਹੁਤੇ ਸ਼ਬਦਾਂ ਲਈ ਇਕ ਸ਼ਬਦ, ਸ਼ਬਦ ਜੁੱਟ, ਵਿਰੋਧਅਰਥਕ ਸ਼ਬਦ, ਸਮਨਾਮੀ ਸ਼ਬਦ

ਭਾਗ-ਚੌਥਾ

ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ :

ਖਾਣ-ਪੀਣ, ਸਾਕਾਦਾਰੀ, ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਗਿਣਤੀ, ਮੌਸਮ, ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਧੰਦਿਆਂ ਨਾਲ ਸੰਬੰਧਿਤ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪ੍ਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਭਾਗ ਪਹਿਲਾ ਵਿਚੋਂ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਉੱਤਰ ਦੇਣੇ ਲਾਜ਼ਮੀ ਹਨ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਚਾਰ-ਚਾਰ ਅੰਕ ਹਨ । **(3x4)=12 ਅੰਕ**
2. ਭਾਗ ਦੂਸਰਾ ਵਿਚੋਂ ਦੋ-ਦੋ ਅੰਕ ਦੇ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ। **(5x2)=10 ਅੰਕ**
3. ਭਾਗ ਤੀਸਰਾ ਵਿਚੋਂ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹਨ। **(2x5)=10 ਅੰਕ**
4. ਭਾਗ ਚੌਥਾ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨਾ ਹੋਵੇਗਾ। **(1x5)=05 ਅੰਕ**

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 13 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵੱਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 37+13 = 50 ਹਨ।

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)-Semester II
COURSE CODE: FST-203
COURSE TITLE: INTRODUCTION TO COMPUTERS

CREDITS (per week): 06

Time: 3 Hours **Max. Marks: 60**

Theory Marks: 28
Practical Marks: 17
Internal Assessment: 15

Instructions for Paper Setters:

Theory: – Question paper will contain seven questions in all and students will be asked to attempt any four questions. All questions will carry equal marks.

Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:
General awareness about computer, uses of MS-word, MS-powerpoint, Windows

Course Contents:
Theory:

UNIT-I

FUNDAMENTAL OF COMPUTER : Introduction to computer, Applications of computer. Components ofcomputer.Primary and Secondary storage.Number systems.

INTRODUCTION TO WINDOWS : Parts of window screen (Desktop, Window, Icons), Start menu, Taskbar,settings, application & document window, anatomy of a window (Title bar, minimize, maximize button, control box, scroll bars, scroll buttons, scroll boxes), Window explorer (expansion, collapsing of directory free, copying, moving, deleting files, folder, creating folders), About desktop icons (recycle bin, my computer, network neighborhood, briefcase), folder, shortcut creation, setting of screen saver, color settings , wallpaper, changing window appearance.

UNIT-II

MS-WORD : Introduction to MS-word, Parts of window of word (Title bar, menu bar, status bar, ruler),Creationof new document, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header, footer, deleting, moving replace, a filing text in document. Saving a document, spell checker, printing a document, creating a table, entering editing text in tables, changing format of table, height width of row or column Editing, deleting, rows, Columns in table. Borders, shading, Templates, Wizards drawing objects, mail merge.

UNIT-III

MS-POWER POINT : Introduction, elements of Power Point Package, starting Power Point, Exploring Power Pointmenus, starting a new slide, Adding Titles, Text and Art, Moving text area and resizing text box starting a slide show, saving a presentation, printing slides, opening an existing presentation, Inserting and deleting slides in a presentation, changing text and correcting error, checking spelling, adding header and footer, closing a presentation, To quit from Power Point views, slide setup, setting up slide show, setting transistors and slide timings, Automatic slide show, Formatting and Enhancing text, Slide with graph.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)-Semester II
COURSE CODE: FST-203
COURSE TITLE: INTRODUCTION TO COMPUTERS

PRACTICALS:

WINDOW 7:

1. Personalize the Windows 7 desktop
2. Add and remove gadgets
3. Add shortcuts
4. Move between windows and customize the taskbar
5. Use Windows Explorer and create folders
6. Move and rename folders and copy files
7. Move, rename, and delete files
8. Compress files and use the address bar
9. Describe and find files and folders
10. Resize, move, and scroll windows

MS-WORD 2010:

1. Create a document files, save it and print it.
2. Spell check the created document file.
3. Create a Table and sort the data within the table.
4. Mail Merge ainivitation to your friends.
5. Apply border to a particular paragraph and shade it 10% with Background yellow colour.

MS-POWER POINT 2010:

1. Create a presentation, save it and print it.
2. Format a presentation with changing the fonts and size and selecting text style and colours.
3. Creat a graph ; add titles, axes and legends to a graph.
4. Add a Clipart picture to a chart.

Book Recommended:

1. Rajaraman V. (2006), "Fundamentals of Computers", 4th Edition, Prentice Hall India, New Delhi
2. Alexis Leon and Matheus Leon (2001), "Introduction to Computers with MS office 2000', 1st edition, Tata McGraw Hill, New Delhi
3. Srivastava, S. S. (2002), "MS-Office", Firewall Media, New Delhi.
4. Peter Norton (2010), "Introduction to Computers", 7th Edition, McGraw Hill, New Delhi
5. Sharma Anshuman, "A book of fundamentals of Information Technology", Lakhanpal Publications
6. MS Office BPB Pubications

Course Outcomes: :On completing the course, the students will be able to:
CO1: Learn computer concepts including their fundamental functions and operations.
CO2: Identify hardware components and learn basic computer operation.
CO3: Use MS-Word efficiently.
CO4: Do formatting, make power point presentations using Microsoft excel.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -II
COURSE CODE: FST–204
COURSE TITLE: GENERAL MICROBIOLOGY

CREDITS (per week): 03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Time: 3 Hours

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory. Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective:

Course Contents:

History of microbiology, parts and usage microscope instrument, various type of microorganisms, their reproduction, their growth and control

Theory:

UNIT-I

Introduction : Discovery of microbial world,theory of spontaneous generation, Germ theory of disease, Koch'spostulates, Pure culture concept, Nature and properties of prokaryotic and eukaryotic micro-organisms. **Microscopy:** Light microscope– Resolving power, Magnification, Bright field, Dark field, Electron microscopy–Transmission Electron microscope, Scanning electron microscope.

UNIT-II

General characteristics and Nutritional requirements: General characteristics of bacteria, yeast, mold, viruses,algae. Types of bacteria, nutritional classification of bacteria.

Reproduction of micro-organisms: Brief account of bacteria, yeast and mold reproduction.

UNIT-III

Microbial Growth : Definition of growth, growth cycle, growth rate, generation time, measurement of growth,effect of environmental factors such as temperature, oxygen, moisture, salt, pH, oxidation- reduction potential and radiations on growth.

Control of Micro organisms: Control of micro organisms by physical, chemical and other chemotherapeuticagents.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -II
COURSE CODE: FST–204
COURSE TITLE: GENERAL MICROBIOLOGY

Practicals:

1. To study different parts of a microscope.
2. Study of instruments (Autoclave, Hot air oven, Incubator, Laminar flow, pH meter, and spectrophotometer) of microbiology laboratory.
3. Preparation of nutrient agar and MacConkey's Agar plates, slants and broth.
4. To study the serial dilution method.
5. To perform pour plate, spread plate and streak plate methods for isolation and enumeration of micro-organisms.
6. To demonstrate acid fast staining.
7. To stain the given bacteria by Gram's staining method.
8. To measure the size of given micro-organisms by ocular and stage micrometer.
9. To determine the number of micro-organisms with a Haemocytometer.
10. To determine the motility of bacteria by hanging drop method.

Books Recommended:

1. Microbiology by Pelczar M.J., Chan E.C.S. & Krieg N.R., 5th Ed., 1987. McGraw Hill Co, Singapore.
2. General Microbiology by Stanier R.Y., In graham J.L., Wheelies M.L. & Painter P.R. 5th Ed. 1993, The Macmillan Press Ltd., London.
3. Microbiology: A Laboratory Manual by Cappuccino J.G. & Sherman N., 2004. Benjamine-Cummings Publishing Co., USA.
4. Laboratory Manual in Microbiology by Gunase Karan P, 1996, New Age International (P) Ltd. New Delhi.

Course Outcome: :On completing the course, the students will be able to:
CO1: Learn about the scope of food microbiology, characteristics of microorganisms, their types and nutritional requirements
CO2: Become aware of various techniques for enumeration and the role of microorganisms in food spoilage
CO3: Study the reproduction of micro organisms.
CO4: Understand factors affecting microbial growth in food.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -II
COURSE CODE: FST–205
COURSE TITLE: FOOD CHEMISTRY

Time: 3 Hours

CREDITS (per week): 03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective:

It makes students understand functions of various food components and chemical reactions involved , checking adulteration of fats and oils, enzymes, their working mechanisms and important enzymes in food processing

Course Contents:

Theory:

UNIT – I

Introduction- Importance of food chemistry. Water in foods, structure and its properties. Water activity, free and bound moisture.

Carbohydrate: Functional properties of sugars and polysaccharides in foods, chemical reactions ofcarbohydrates- Hydrolysis, Enolization, Mutarotation, Dehydration, Browning reactions, Gelatinization and Retrogradation of starch.

Proteins: Common food proteins, Functional properties of proteins, Denaturation, renaturation,Gelation, and Hydrolysis of proteins.

UNIT – II

Lipids: Physical characteristics of lipids, chemical properties of fats (hydrogenation, interesterification,oxidation-rancidity & reversion), Edible fats and oils, Tests to check purity of fats and oils, Emulsions, Lipids of biological importance like cholesterol and phospholipids, functional properties of lipids. Effect of processing on lipids and nutritional aspect of lipids.

UNIT – III

Enzymes: Nomenclature, Definition, mechanism of enzyme action, factors affecting enzyme action,Enzyme inhibition, enzymes important in foods.

Coloring and Flavoring agents: Brief introduction.

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BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -II
COURSE CODE: FST–205
COURSE TITLE: FOOD CHEMISTRY

Practicals:

1. Determination of reducing sugar in the given food sample.
2. Nitrogen analysis by micro-kjeldahl method.
3. Determination of salt in food products.
4. Qualitative analysis of carbohydrates.
5. Qualitative analysis of proteins in given sample.
6. Qualitative analysis of lipids in the given sample.
7. Determination of food enzymes.
8. Estimation of vitamin C.

Books Recommended:

1. Food Chemistry by L. H. Mayer.
2. Hand Book of Analysis of Fruits & Vegetables by S. Ranganna.
3. Food Chemistry by Fennemma.

Course Outcomes: :On completing the course, the students will be able to:
CO1: Understand how food components contribute to overall quality of foods
CO2: Evaluate various reactions involved in different foods.
CO3: Learn about properties and function of major food components.
CO4: Know about various reactions of food components which affects the quality of foods.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)- Semester II
COURSE CODE: FST – 206
COURSE TITLE: FOOD ADDITIVES

Time: 3hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory. Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective

Classification of food additives and their use in food processing as well as their functions

Course Contents:

Theory:

UNIT-I

Definitions, nutritional and non-nutritional food additives, uses and functions of Acid, Base, Buffer systems, Salts and chelating/sequestering agents.Low calorie and non nutritive sweeteners.

UNIT-II

Antioxidants, Emulsifying and stabilizing agents, Anti-caking agents, Humectants, thickeners, firming agents.

Flour bleaching agents and Bread improvers.

UNIT-III

Anti microbial agents / Class I and Class II preservatives, Food colour, pigments, their importance and utilization, Flavoring agents and related substances, Clarifying agents.

Practicals:

1. Description of generally recommended as safe (GRAS) food additives.
2. Spectrophotometric method for total chlorophyll.
3. Clarification of fruit juices,
4. Use of additives in bakery, fruits, vegetables, milk and meat products.
5. Determination of adulteration in milk, cereals, oils & fats, spices.

Books Recommended:

1. Food Chemistry, O.R.Fennema
2. Food Chemistry, Belitz, Grosch
3. Food Facts & Principles by Shakuntala Manay N & Shadoksharaswamy N, 1996, New Age, World Publishers.

Course Outcome:On completing the course, the students will be able to:

CO1: Know about various food additives used in food industry.
CO2: Understand classes, functions and properties of different additives.
CO3: Learn the working mechanisms of different food additives.
CO4: Utilize additives in food processing.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -II
Course Code:DA2
Course Title: DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
DRUG ABUSE: MANAGEMENT AND PREVENTION
(Compulsory for all Under Graduate Classes)

CREDITs (per week):

Time: 3 Hours
Instructions for Paper Setters:
Section–A: (15 Marks): It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying 05 marks. Answer to any of the questions should not exceed two pages.
Section–B: (20 Marks) It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying 10 marks. Answer to any of the questions should not exceed four pages.
Section–C: (15 Marks) It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages.

Course Objective:

CO1: To create awareness about the role of parents and other family members in preventing drug abuse

CO2: To study the role of school and keeping an eye on students in preventing drug abuse

CO3: To study the role of media, campaigning and various programs to control drug menace

CO4: To know about various legal aspects of drugs in india.

Course Contents:

UNIT-I

- **Prevention of Drug abuse**

Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny. **UNIT-II**

- School: Counseling, Teacher as role-model. Parent-teacher-Health Professional Coordination, Random testing on students.

UNIT-III

- **Controlling Drug Abuse**

Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and

media, Campaigns against drug abuse, Educational and awareness program

UNIT-IV

- Legislation: NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -II
Course Code:DA2
Course Title: DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
DRUG ABUSE: MANAGEMENT AND PREVENTION
(Compulsory for all Under Graduate Classes)

Books Recommended:

1. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
2. Gandotra, R. and Randhawa, J.K. 2018. voZrI d[otos'A (BPky'oh) gqpzXB ns o'eEkw. Kasturi Lal & Sons, Educational Publishers, Amritsar- Jalandhar.
3. Inciardi, J.A. 1981. The Drug Crime Connection. Beverly Hills: Sage Publications.
4. Modi, Ishwar and Modi, Shalini (1997) Drugs: Addiction and Prevention, Jaipur: Rawat Publication.
5. Randhawa, J.K. and Randhawa, Samreet 2018. Drug Abuse-Management and Prevention. Kasturi Lal & Sons, Educational Publishers, Amritsar- Jalandhar.
6. Sain, Bhim 1991, Drug Addiction Alcoholism, Smoking obscenity New Delhi: Mittal Publications.
7. Sandhu, Ranvinder Singh, 2009, Drug Addiction in Punjab: A Sociological Study. Amritsar: Guru Nanak Dev University.
8. Singh, Chandra Paul 2000. Alcohol and Dependence among Industrial Workers: Delhi: Shipra. 9. World Drug Report 2011, United Nations office of Drug and Crime.
10. World Drug Report 2010, United Nations office of Drug and Crime

Course Outcome:On completing the course, the students will be able to:
Prevention and control of drugs, role of family, friends and school, Legal complications involves, Criminal aspect

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)- Semester III
COURSE CODE: FST–301
COURSE TITLE: FOOD MICROBIOLOGY

Time: 3 Hours

CREDITS (per week):03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.
Course objectives:
Origin of food microbiology, Factors affecting microbial growth in food, traditional and modern methods of microbial examination in food, Microbial spoilage of different food and food products, Illnesses associated with consumption of contaminated food

Course Contents:
Theory:

UNIT-I

Introduction - Origin of food microbiology as science, Food as nutrient for various microorganisms,

Factor affecting the growth and survival of microorganisms in foods, General features and importance

of different groups of bacteria, yeasts and molds important in foods.

Methods for microbial examination of foods - Traditional, non-traditional and rapid methods for the microbial examination of food and food products.

UNIT-II

Food Spoilage - Microbial and biochemical aspect of food spoilage, role of bacteria, yeast and molds infood spoilage, Spoilage of cereal and cereal products, fruits and vegetables, meat and meat products, milk and milk products, fish and fish products, spoilage of egg and poultry and heated canned foods.

UNIT-III

Food Borne Illness - Food intoxication and food infection, Bacterial food poisoning by*Staphylococcusaureus, Clostridium botulinum, Salmonella, E. coli, Clostridium perfringens, Listeria monocytogenes*, and *Campylobacter jejuni*, Food borne viruses, Aflatoxigenic molds, Investigation of food borne disease outbreak

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)
COURSE CODE: FST–301
COURSE TITLE: FOOD MICROBIOLOGY

Practicals:

1. Sterilization and disinfection of equipment used in food microbiology laboratory.
2. Preparation of media, slant and broths required in the microbial analysis of foods.
3. To count the number of microorganisms by direct microscopic count method.
4. Study of different types of microorganism colony shapes on agar plates.
5. Study of the capsular and spore staining methods.
6. Isolation of fungi from food materials.
7. Study of incubation test of heated canned foods.
8. Study of Dye reduction test of milk.
9. Microbiological analysis of egg, cereal product and fruit product.

1. Frazier WC and Westoff DC "Food Microbiology" 4th edition Tata Mc graw-Hill Publishing
2. Jay JM "Modern Food Microbiology" 3rd edition CBS Publishers and distributors Delhi, 1987
3. Adams MR and Moss MO "Food microbiology" New Age International (P) Ltd. 1996
4. Gunasekaran P. "Laboratory Manual in Microbiology", New Age International (P) Ltd. 1996.

Course Outcome: :On completing the course, the students will be able to:

CO1: Know the origin of food microbiology and factors causing food spoilage.

CO2: Study the role of microorganisms in causing spoilage of different food products.

CO3: Understanding qualitative and quantitative analysis of food for microbial growth.

CO4: Become aware of the role of microorganisms in causing food borne diseases.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -III
COURSE CODE: FST–302
COURSE TITLE: FLUID MILK PROCESSING

Time: 3 Hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory. Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Definition, important constituents, factor affecting quantity and quality of milk, various types of milks available in market and their standards, major processing techniques involved in milk processing at commercial level

Course Contents:

Theory: **UNIT-I**

Milk: Definition, composition of milk, important characteristics of major constituents of milk i.e. milkfat, milk proteins, lactose and minerals and minor constituents of milk. Factors affecting the quality and quantity of milk produced by milch animals.Physical, chemical and nutritive properties of milk.

UNIT-II

Market Milk: Brief introduction to Standard milk, Toned milk, Double toned milk, Flavoured milk,Vitamin enriched milk, Reconstituted milk and recombined milk. Legal and ISI standards of milk. Adulteration of milk and its detection. Common preservatives used in milk and their detection. Clean milk production.

UNIT-III

Milk Processing: Processes of straining, filtration and clarification.

Standardization: Definition of standardization, purpose and uses of standardization process. Use ofPearson's square method to solve the standardization problems in dairy industry.

Homogenization: Definition, Effect of homogenization on milk. Uses of homogenization.Checking theeffectiveness of homogenization.

Pasteurization :Definition, purposes and objects of pasteurization–LTLT and HTST processes of

pasteurization.

Sterilization: Definition, Method for manufacturing sterilized flavored milk. UHT process.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -III
COURSE CODE: FST–302
COURSE TITLE: FLUID MILK PROCESSING

Practicals:

1. Sampling equipment and sampling of milk.
2. Platform tests (Acidity, COB and Alcohol test).
3. Organoleptic Tests.
4. Determination of milk fat percentage by Gerber's method.
5. Determination of specific gravity by lactometer.
6. Determination of SNF percentage and TS percentage of milk with lactometer.
7. Detection of common adulterants and preservatives of milk.
8. Reporting on the suitability of milk for heat processing.
9. Reporting on the quality of given sample of milk.
10. Visit to milk processing plants/NDRI, Karnal.

Recommended Books:

1. Outlines of Dairy Technology by Sukumar De, 1980, Oxford University Press, New Delhi.
2. Milk & Milk Products by Eckles, CH, Combs WB, Macy H, 1997, McGraw Hill Book

Course Outcome: :On completing the course, the students will be able to:

CO1: Know about milk composition and its various physico-chemical properties.

CO2: Learn about various dairy processing unit operations.

CO3: Assess quality of different milks available in market and milk products.

CO4: Standardize different types of milks according to food laws.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -III
COURSE CODE: FST–303
COURSE TITLE: PROCESSING OF MEAT & MEAT PRODUCTS

Time: 3 Hours

CREDITS (per week): 03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory. Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Scope of meat processing industry, composition and structure of meat, classification, meat quality, ante- and Post mortem changes in meat, various techniques involved in meat processing

Course Contents:

Theory:

UNIT-I

1. Scope of meat processing industry in India.
2. Structure, composition & nutritive value of meat.
3. Classification of meat - Mutton, Pork & Sheep.
4. Meat quality parameters- Meat color, water holding capacity, Marbling, firmness & factors affecting it.

UNIT-II

5. Ante-mortem examination of meat animal, their slaughtering & dressing.
6. Postmortem changes in meat: Rigor mortis, biochemical changes associated with rigor-mortis, conversion of muscle to meat.
7. Methods of tenderization, factors affecting tenderness.

UNIT-III

8. Chilling, freezing, canning, drying, curing & smoking of meat.
9. Mechanical deboning of meat, Restructed meat products, Inter-mediate moisture meats, Meat by-products.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -III
COURSE CODE: FST–303
COURSE TITLE: PROCESSING OF MEAT & MEAT PRODUCTS

Practicals:

1) Pre slaughter operations of meat animals.
2) Slaughtering and dressing of meat animals.
3) Study of post-mortem changes.
4) Evaluation of meat quality.
5) Preservation of meat by different methods
6) Preservation of meat by pickling method.
7) Preparation of different meat products- canned dehydrated and barbecued.
8) Preparation of sausages, burger, kabab, meat balls, meat patties.
9) Visit to slaughter houses.

Books Recommended:

1) The Meat We Eat by Romans. JR and Costllo WJ, Carlson WC, Greaser ML and Jones KW, 2004, Interstate Publishers, USA.
2) Meat Science & Applications by Y.H.Hui, Wai-Kit Nip, Robert W. Rogers and Owen A. Young.

Course Outcome: :On completing the course, the students will be able to:

CO1: Understand the structural composition, types and quality of meat.

CO2: Know about various techniques of slaughtering animals.

CO3: Learn about different preservation techniques of meat

CO4: Know novel products available in meat industry.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -III
COURSE CODE: FST–304
COURSE TITLE: POST HARVEST MANAGEMENT OF FRUITS & VEGETABLES

Time: 3 Hours

CREDITS (per week):03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:
Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Learning Objectives:
Structure and composition of fruits and vegetables, Various post-harvest lossess encountered, their prevention, harvesting methods, importance of maturation and its determination, Physiological process involved in fruits, measurement of respiration rate, Shelf-life, various methods to enhance shelf life of fresh produce.

Course Contents:
Theory:

UNIT-I

Post Harvest Technology: Definition, Importance and Scope of Post Harvest Technology in India.
Structure and Composition of Fruits and Vegetables.
Post Harvest Losses: Definition, Post harvest losses of fruits and vegetables, Factors affecting postharvest losses, Prevention of post harvest losses, Post harvest loss reduction. **Harvesting:** Definition, Importance, Harvesting methods–Manual and Mechanical.
Maturation: Definition, Maturity indices of fruits and vegetables, Importance of maturity indices,Determination of maturity indices.

UNIT-II

Physiology of growth and development of fruits
Climacteric and Non climacteric fruits
Ripening: Definition, Changes during ripening, Ethylene biosynthesis, Artificial Ripening **Measurement of respiration rate**-Gas Chromatography and Gas flow method.
Cleaning, Sorting & Grading of fruits and vegetables Post harvest diseases of fruits and vegetables

UNIT-III

Treatments to enhance shelf life of fruits and vegetables:
Physical Treatments: Precooling, Waxing, Curing, Packaging, Vapour heat treatment, Irradiation,thermal treatment.
Chemical treatments: Fungicides and Growth Regulators.
Transportation methods: Mode of transportation of fruits and vegetables - Road, Rail, Sea, Air(Refrigerated and non-refrigerated)
Storage of fruits and vegetables
Definition, Objectives, Factors affecting storage, Methods of Storage
Traditional methods: On sight storage, Pit storage, High altitude cooling, Cellar and Underground, Night ventilation, Zero Energy Cool chamber (ZECC)
Improved storage methods: CAP, MAP, Vacuum packaging, Hypobaric storage.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -III
COURSE CODE: FST–304
COURSE TITLE: POST HARVEST MANAGEMENT OF FRUITS & VEGETABLES

Practicals:

1. Analyze the maturity stages of fruits and vegetables.
2. To study the effect of pre-packing of fruits and vegetables.
3. To study the effect of pre-cooling of fruits and vegetables.
4. To study the ripening of fruits and vegetables.
5. To study the shelf life of fruits and vegetables at low- temperature.
6. To study the different types of spoilage in fruits and vegetables.
7. To determine the optimum temperature for storage of different fruits and vegetables.
8. To study the effect of wax coating on shelf life of fruits and vegetables.
9. Visit to a cold store and controlled atmosphere storage.

Books Recommended:

1. Preservation of fruits and vegetables by Girdhari Lal, Sidappa G S and Tandon G L, 1960, ICAR, New Delhi.
2. Food facts & principles by Shanuntala Manay N & Shadoksharaswamy N, 1996, New Age World Publisher, CA.
3. Food Science by Potter, N.N., CBS Publisher, New Delhi.

Course Outcome:On completing the course, the students will be able to:
CO1: Familiarize themselves with different aspects of post- harvest technology and recent developments.
CO2: Understand the correlation of physiology and biochemistry of fresh produce with storage issues.
CO3: Measure respiration rate of fresh produce quantitatively.
CO4: Know about extension of shelf life of fresh produce.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)-III
COURSE CODE: FST – 305
COURSE TITLE: CEREAL MILLING AND LEGUMES

Tim: 3 Hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory. Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective:

Different types of cereals, their structure, milling methods, quality evaluation, composition and milling methods of pulses and legumes, anti-nutritional factors present and their elimination

Course Contents:

Theory:

UNIT-I

Cereal grain definition and different types of grains.
Structure and chemical composition of wheat, rice and maize.
Milling criteria and quality criteria for grains.

UNIT-II

Wheat cleaning and conditioning, traditional and modern milling of wheat and flour extraction rate.
Wheat flour- types and usage, Improvers and Bleachers - their principle and action.
Traditional and modern milling of paddy.
Dry and wet milling of maize.

UNIT-III

Introduction and chemical composition of pulses.
Milling or decortication and polishing of pulses.
Anti-nutritional factors present in pulses and their elimination.

Practicals:

1. Determination of physical characteristics of wheat.
2. Determination of physical characteristics of rice.
3. Determination of moisture, ash and crude fibre in cereal grains.
4. Milling of wheat into flour.
5. Milling of paddy to brown rice and white rice.
6. Cooking quality of rice.
7. Visit to flour mill, rice mill and pulse mill.

Recommended Books:

1. Kent's Technology of Cereals by K. A. Rosentrater and A. D. Evers, 5th Ed., 2018, Woodhead Publishing Ltd., UK.
2. Principle of Cereal Science & Technology by J.A. Delcour and R.C. Hoseney, 3rd Edition., 2010, AACC International, St.Paul, Minn.
3. The Chemistry & Technology of Cereal as Food & Feed by Matz S.A, 1996, CBS Publishers, New Delhi.
4. Food Science by Potter NN, 5th Ed., 2006, CBS Publisher, New Delhi.
5. Technology of cereal, legume and oil seeds by Chakrobrty S. Deor, IBH Publisher.

Course Outcome:On completing the course, the students will be able to:

CO1: Understand structure, composition and processing of major cereals.
CO2: Get knowledge on milling of different grains.
CO3: Learn about processing of pulses.
CO4: Assess quality of different cereal grains.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –III
COURSE CODE: ESL–221
COURSE TITLE: ENVIRONMENTAL STUDIES–I (COMPULSORY)
B.A./B.Sc. (Biotech., Food Sci., Comp. Sci., Eco., FD., IT., Med., Non Med.)/B.Sc. (Hons.-Physics, Chemistry, Maths)/B.B.A./B.C.A./B.Com./B.Com. (Hons.)/BJMC/BA Social Sciences/ BA (Hons.) Punjabi, BA (Hons.) English

Time: 3 Hrs. **Theory Lectures: 1½ Hours/ Week**
Max. Marks: 50

Instructions for Paper Setters: The question paper will consist of three sections. Candidate will be required to attempt all the sections. Each unit of the syllabus should be given equal weightage of marks.
Section–A: (16 Marks): It will consist of five short answer type questions. Candidates will be required to attempt four questions, each question carrying four marks. Answer to any of the questions should not exceed two pages.
Section–B: (24 Marks): It will consist of five questions. Candidates will be required to attempt four questions, each question carrying six marks. Answer to any of the questions should not exceed four pages.
Section–C: (10 Marks): It will consist of two questions. Candidate will be required to attempt one question (carrying ten marks) only. Answer to the question should not exceed 5 pages.

Course Objective:
CO1: Gain in-depth knowledge on importance of environment studies and natural resources that sustain life
CO2: To understand importance and role of ecosystem
CO3: To understand the relationship of environment with social issues.
CO4: Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions

Course Contents:

Unit-I

The Multidisciplinary Nature of Environmental Studies:
- Definition, scope & its importance.
- Need for public awareness.

Natural Resources:
- Natural resources and associated problems:

a) Forest Resources: Use of over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
b) Water Resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food Resources: World food problems, change caused by agriculture and overgrazing, effects or modern agriculture, fertilizer-pesticide problem, salinity, case studies.
e) Energy Resources: Growing of energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.
f) Land Recourses: Land as a resource, land degradation, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Unit-II

Ecosystem:
- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystems:
a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER –III
COURSE CODE: ESL–221
COURSE TITLE: ENVIRONMENTAL STUDIES–I (COMPULSORY)

Unit-III

Social Issues and Environment:
From unsustainable to sustainable development.
Urban problems related to energy.
Water conservation, rain water harvesting, watershed management.
Resettlement and rehabilitation of people; its problems and concerns. Case studies.
Environmental ethics: Issues and possible solutions.
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocause. Case studies.
Wasteland reclamation.
Consumerism and waste products.
Environmental Protection Act:

- Air (prevention and Control of Pollution) Act.
- Water (prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.

Issues involved in enforcement of environmental legislation.
Public awareness.

Unit-IV

National Service Scheme

- **Introduction and Basic Concepts of NSS:** History, philosophy, aims & objectives of NSS; Emblem, flag, motto, song, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries.
- **Health, Hygiene & Sanitation:** Definition, needs and scope of health education; Food and Nutrition; Safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan); National Health Programme; Reproductive health.

References/Books:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
3. Down to Earth, Centre for Science and Environment, New Delhi.
4. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
5. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
6. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
7. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
8. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
9. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar
10. Kanta, S., 2012. Essentials of Environmental Studies, ABS Publications, Jalandhar.

Course Outcome:On completing the course, the students will be able to:
Students will be able to critically examine all sides of environmental issues and apply understanding from disciplines such as history, economics, psychology, law, literature, politics, sociology, philosophy, and religion to create informed opinions about how to interact with the environment on both a personal and a social level. Various precautions to be taken for ecosystem that help every form of life on earth

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -IV
COURSE CODE: FST–401
COURSE TITLE: PROCESSING OF MILK PRODUCTS-I

Time: 3 Hours

CREDITS (per week): 03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective

Cream: its types, methods of cream separation from milk, use of cream separator, neutralization and ripening of cream, changes associated with ripening, composition and preparation of butter, defects involved, preparation of ghee and its storage.

Course Contents:

Theory:

UNIT-I

Cream: Different types of cream with their respective fat content, composition of cream, productionmethods: gravity methods, mechanical method- by the use of cream separator. Factors affecting the richness of cream produced by cream separator.Efficiency of cream separator. Care of cream separator. Selection of site for setting up creamery.

Neutralization of cream, use of different types of neutrilizers, double neutralization of cream.Ripening of cream for butter making: natural ripening, ripening with the use of starter cultures.Objects of cream ripening.Various changes during the ripening of cream

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UNIT-II

Butter : Types of butter, composition. Preparation of butter. Factors affecting the churn ability of cream. Churning theories.
Grading of butter:

1. Requirements of grading room
2. Grading procedure
3. Score card method.

Defects of butter their possible causes and their remedies.
Standards of butter and shelf life.

UNIT-III

Ghee: Manufacturing methods of ghee:

1. Cream method
2. Butter method
3. Pre-stratification method

Granularity in ghee, storage of ghee and shelf life.

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BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -IV
COURSE CODE: FST–401
COURSE TITLE: PROCESSING OF MILK PRODUCTS-I

Practicals:

1. To study the construction and working of a cream separator.
2. Cream separation.
3. Neutralization of cream.
4. Ripening of cream.
5. Preparation of Butter.
6. Determination of moisture content in butter.
7. Preparation of ghee from cream.
8. Preparation of ghee from butter.
9. Visit to different milk plants to learn about cream, butter and ghee processing operations.
10. Visit to N.D.R.I., Karnal.

Recommended Books:

1. Outlines of Dairy Technology by Sukumar De, 1980, Oxford University Press, UK.

2. Milk & Milk Products by Eckles, Combs, Henery C, and Willes C, 1997, Tata McGraw Hill Publishers, USA.

3. Principles of Dairy Processing by Warner JN, 1976, Wiley Science Publishers, USA.

Course Outcome:On completing the course, the students will be able to:

CO1: Know about the manufacturing process of different milk products.

CO2: Learn about composition of various milk products

CO3: Understand about various changes related to cream ripening

CO4: Know about various physicochemical properties of different milk products.

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BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -IV
COURSE CODE: FST – 402
COURSE TITLE: EGG, POULTRY AND FISH TECHNOLOGY

Time: 3hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory. Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective

Structure and composition of egg, various technologies involved in egg processing at industrial level, Types of poultry, their ante and post-mortem changes, slaughtering methods, poultry sanitation dn poultry waste disposal, Fish composition, processing of fish and fish products.

Course Contents:

Theory:

UNIT-I

Structure and composition of egg.Nutritive value, interior qualities, grading, handling, packaging, storage, transportation, freezing, pasteurization, de-sugarization, dehydration, functional properties of eggs.

UNIT-II

Types of Poultry –Hen, Turkey, Ducks, Geese.Ante-mortem examination & slaughtering of hen.Poultry sanitation & waste disposal.MAP of Poultry.

UNIT-III

Types of fish, composition, structure and nutritive value, post – mortem changes in fish, on-board handling, storage and transportation of fish, curing, smoking, salting, canning, freezing and drying of fish, Comminuted Fish Products, Fish protein concentrate, Packaging of fish, Utilization of fish and marine industry by-products.

Practicals:

1. Slaughtering of hen.
2. Determination of egg components.
3. Grading and quality evaluation of eggs.
4. Preservation of shell eggs.
5. Preparation of egg products, boiled, fried, poached, scrambled, omellette.
6. Determination of egg density
7. To check freshness of fish.
8. Chilling & freezing of fish.
9. Preparation of fish & marine products.
10. Visit to industry.

Books Recommended:

1. Egg Science and Technology by Stadelman WJ, and Cotterill OJ, 2002, CBS Publishers, New Delhi.
2. Poultry Meat and Egg Production by Parkhurst C. and Mountney GJ, 2002, CBS Publishers, New Delhi.
3. Fish Procesing & Preservation by Charles L. Cutting

Course Outcome:On completing the course, the students will be able to:

CO1: Know about all commercial aspects of egg processing.
CO2: Learn about types and breeds of poultry important for industrial production, ante and postmortem changes.
CO3: Understand waste utilization and disposal of poultry by-products.
CO4: Know about commercial processing of fish and fish products.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)-IV
COURSE CODE: FST – 403
COURSE TITLE: FRUITS & VEGETABLE PROCESSING

Time: 3 hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory. Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Classification, chemical composition, nutrition, processing fo fresh produce, canning and bottling of fruits and vegetable products, freezing and drying methods, preparation and formulation of different products prepared, processing of tomato and tomato products.

Theory:

UNIT-I

Classification, chemical composition and nutritive value of fruits and vegetables.

Preparing fruits and vegetables for processing-washing, sorting, grading, peeling, blanching, cutting, destoning and pitting.
Canning and bottling of fruits and vegetables products.

UNIT-II

Freezing- General Methods of freezing of fruits and vegetables, their packaging and storage.
Drying of fruits and vegetables.

Definition, formulation, preparation and standards of fruit juices, Squashes and cordials; Fruit syrups, nectar, RTS, pulp.

UNIT-III

Preparation and standards of Jam, Jelly & marmalades, preserve candied and crystallized fruits.
Preparation of Pickles.
Tomato processing-Tomato juice, puree, paste, chutney, sauce, soup and ketchup.

Practicals:

1. Preparation of fruit juice.
2. Preparation of squashes.
3. Preparation of jam, jellies, marmalade.
4. Preparation of potato chips.
5. Preparation of pickles- sweet and sour.
6. Dehydration and sun-drying of fruits and vegetables.
7. Preparation of tomato puree, paste and ketchup.
8. Organoleptic evaluation of fruits and vegetable products.
9. Visit to food industry.

Recommended Books:

1. Preservation of Fruits and Vegetables by Girdhari Lal , Sidappa G S and Tandon G L, 1960, ICAR, New Delhi.
2. Food Facts & Principles by Shanuntala Manay N & Shadoksharaswamy N ,1996, New Age World Publisher, CA.
3. Food Science by Potter, N.N., CBS Publisher, New Delhi.

Course Outcome:On completing the course, the students will be able to:

CO1: Understand various steps involved in processing of different products.

CO2: Learn about standardization and formulation of different products.

CO3: Know about available commercial products.

CO4: Learn processing of tomato in form of different products.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -IV
COURSE CODE: FST–404
COURSE TITLE: PROCESSING OF CEREALS AND LEGUMES

Time: 3 Hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory. Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Quality evaluation of cereals by using various instruments, bakery ingredients and their role in baking, preparation of various bakery products, parboiling of rice, Processing of rice bran oil, manufacture of corn flakes and corn sweetners, preparation of various soyabean products

Course Contents:

Theory:

UNIT-I

Quality criteria for wheat flour, physical dough testing instruments, major and minor ingredients used for bakery products, leavening agents.
Preparation methods of bread, cookies and cakes.

UNIT-II

Parboiling of paddy-methods, advantages and disadvantages, various changes during parboiling
Storage and uses of rice bran, extraction of rice bran oil and its use.
Manufacture of corn flakes, tortilla and corn syrup from corn starch.

UNIT-III

Soybean milk and Tofu. Soy protein concentrates and isolates
Protein enriched cereal foods.

Practicals:

1. Preparation of cake or Bread
2. Preparation of biscuits or cookies.
3. Parboiling of paddy.
4. Effect of parboiling on milling efficiency
5. Estimation of free fatty acids in flour and rice bran.
6. Determination of dry and wet gluten in flour.
7. Extraction of oil from rice bran.
8. Visit to food industry.

Recommended Books:

1. Kent's Technology of Cereals by K. A. Rosentrater and A. D. Evers, 5th Ed., 2018, Woodhead Publishing Ltd., UK.
2. Principle of Cereal Science & Technology by J.A. Delcour and R.C. Hoseney, 3rd Edition., 2010, AACC International, St.Paul, Minn.
3. The Chemistry & Technology of Cereal as Food & Feed by Matz S.A, 1996, CBS Publishers, New Delhi.
4. Pulse Chemistry and Technology by B.K. Tiwari and N. Singh, 2012, RSC Publications, UK.
5. Food Science by Potter NN, 5th Ed., 2006, CBS Publisher, New Delhi.

Course Outcome:On completing the course, the students will be able to:

CO1: Evaluate quality of wheat flour

CO2: Learn manufacturing processes of different bakery products, corn products and rice bran oil

CO3: Know about parboiling of rice and its benefits

CO4: Learn about high protein products available in market

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -IV
COURSE CODE: FST–405
COURSE TITLE: FOOD PLANT HYGIENE AND SANITATION

Time: 3 Hours **CREDITS (per week): 03**

Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives

Personal hygiene, different methods of cleaning and sanitization, various cleaning agents, sanitizing agents, disinfectants used, sanitation in food industry, infestation of rodents, insects and their control, water hygiene, planning and implementation of healt personnel

Course Contents:

Theory:

UNIT-I

Importance of personal hygiene of food handler-habits, clothes, illness, education of handler in handling and service.
Cleaning agents and disinfectants.

UNIT-II

Cleaning methods – sterilization, disinfection, heat & chemicals, chemical tests for sanitizer strength.
Food sanitation-Principles & methods, control, inspection.

Sanitation in fruits & vegetables industry, cereals industry, dairy industry, meat, egg & poultry units.

UNIT-III

Control of infestation, rodent control, vector control, Use of pesticides.
Hygiene of water used for processing.
Planning & implementation of training programmes for health personnel.

Practicals:

1. Sterilization of equipments used in the laboratory by using heat and chemicals.
2. Determination of B.O.D
3. Determination of C.O.D
4. Determination of sanitary status of plant equipment.
5. Chlorination of water.
6. To study the bacteriology of water.
7. Chemical analysis of water.

Recommended books:-

1. Principles of Food Sanitation by Marriott, 5th ed., 2006, CBS Publisher, New Delhi.
2. Hobbs, B. C. and R. J. Gilbert Food Poisoning and Food Hygiene , 4th edition The English Language Book Society and Edward Arnold.
3. Longree K. (1967), Quantity Food Sanitation, Inter science Publishers, New York.
4. Kawata, K. (1963) Environmental Sanitation in India, Lucknow Publisher, New York.
5. Principles of food sanitation –II Edition, AVI Book, Van Noistrand Reinhold, New York.

Course outcome:On completing the course, the students will be able to:

CO1: Understand personal hygiene and safety rules.

CO2: Know about various cleaning and sanitation methods implementd in plant

CO3: Study role of food sanitation at commercial level

CO4: Tackle pest infestation in a food plant

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -IV
COURSE CODE: ESL–222
COURSE TITLE: ENVIRONMENTAL STUDIES–II (COMPULSORY)
B.A./B.Sc. (Biotech., Food Sci., Comp. Sci., Eco., FD., IT., Med., Non Med.)/B.Sc. (Hons.-Physics, Chemistry, Maths)/B.B.A./B.C.A./B.Com./B.Com. (Hons.)/BJMC/BA Social Sciences/ BA (Hons.) Punjabi, BA (Hons.) English

Time: 3 Hrs. **Credits (per week): 1½ Hours**
Max. Marks: 50

Instructions for Paper Setters: The question paper will consist of three sections. Candidate will be required to attempt all the sections. Each unit of the syllabus should be given equal weightage of marks.
Section–A: (16 Marks): It will consist of five short answer type questions. Candidates will be required to attempt four questions, each question carrying four marks. Answer to any of the questions should not exceed two pages.
Section–B: (24 Marks): It will consist of five questions. Candidates will be required to attempt four questions, each question carrying six marks. Answer to any of the questions should not exceed four pages.
Section–C: (10 Marks): It will consist of two questions. Candidate will be required to attempt one question (carrying ten marks) only. Answer to the question should not exceed 5 pages.

Course Objectives:

CO1: Students will get to know about importance of diversity in life and the role of ecosystem in life.
CO2: Students will be aware of different types of pollution in world and measured to control.
CO3: Students will know about solid waste management and disaster management.
CO4:They will get to know about the role of environement for humans.

Course Contents:

Unit-I

Biodiversity and its Conservation:

- Definition: Genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of Biodiversity: Consumptive use; productive use, social, ethical, aesthetic and option values.
- Biodiversity of global, National and local levels.
- India as mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to Biodiversity: Habitat loss, poaching of wild life, man wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of Biodiversity: In situ and Ex-situ conservation of biodiversity.

Unit-II

Environmental Pollution:

- Definition, causes, effects and control measures of:
  a) Air Pollution
  b) Water Pollution
  c) Soil Pollution
  d) Marine Pollution
  e) Noise Pollution
  f) Thermal Pollution
  g) Nuclear Hazards
  h) Electronic Waste
- Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster Management: Floods, Earthquake, Cyclone and Landslides.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER -IV
COURSE CODE: ESL–222
COURSE TITLE: ENVIRONMENTAL STUDIES–II (COMPULSORY)

Unit-III

Human Population and the Environment

- Population growth, variation among nations.
- Population explosion-Family welfare programme.
- Environment and human health.
- Human rights.
- Value education.
- HIV/AIDS.
- Women and child welfare.
- Role of information technology in environment and human health.
- Case studies.
- Road Safety Rules & Regulations**:** Use of Safety Devices while Driving, Do's and Don'ts while Driving, Role of Citizens or Public Participation, Responsibilities of Public under Motor Vehicle Act, 1988, General Traffic Signs.
- Accident & First Aid**:** First Aid to Road Accident Victims, Calling Patrolling Police & Ambulance.

Unit-IV

National Service Scheme:

- **Entrepreneurship Development:** Definition & Meaning; Qualities of good entrepreneur; Steps/ ways in opening an enterprise; Role of financial and support service Institutions.
- **Civil/Self Defense:** Civil defense services, aims and objectives of civil defense; Needs for self-defense training.

Field Visits:

- Visit to a local area to document environmental assets–river/forest/grassland/hill/ mountain.
- Visit to a local polluted site–Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems–pond, river, hill slopes etc.
- Contribution of the student to NSS/any other social cause for service of society.

Note: In this section the students will be required to visit and write on the environment of an area/ ecosystem/vi1lage industry/disaster/mine/dam/agriculture field/waste management/hospital etc. with its salient features, limitations, their implications and suggestion for improvement.

References/Books:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
3. Down to Earth, Centre for Science and Environment, New Delhi.
4. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
5. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
6. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
7. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
8. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
9. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar
10. Kanta, S., 2012. Essentials of Environmental Studies, ABS Publications, Jalandhar.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) Semester V
COURSE CODE: FST – 501
COURSE TITLE: PRINCIPLES OF FERMENTATION TECHNOLOGY

Time:3 hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective

Fermentation microbiology, Fermentation classification, Rate of microbial growth, methods of fermentation, requirements for industrial fermentation process, Construction and working of a Fermentor and its type

Course Contents:

Theory:

UNIT-I

Introduction to fermentation, Fermentation an ancient tradition, Developments in fermentation technology, Scope and future prospects of fermentation microbiology, Gaden's fermentation classification, Rate of microbial growth and death, Rate of Product formation, Classification of food fermentations - Alcoholic, lactic and acetic acid fermentations

UNIT-II

General methods of fermentation – Aerobic fermentation, Anaerobic fermentation, Solid state fermentation, and submerged fermentation, Batch and continuous fermentation. Pre-requisite for Industrial fermentation process,

UNIT -III

Component parts of a fermentor and their functions, Peripheral parts and accessories of a fermentor, Online and off-line devices of fermentor, Biosensors in fermentation monitoring, Common measurement and control systems in fermentor, Contamination problems in fermentation process, Computer applications in fermentation process.

Practicals:

1. To study different parts of a fermentor
2. To study the operation /working of a fermentor
3. To study media formulation a and sterilization of a fermentation process
4. To study the growth of given microorganism in a batch culture
5. To perform fermentation test for a given microorganism
6. To study the effect of different temperatures on growth of a given Microorganism
7. To study the effect of aeration on growth kinetics of a given Microorganism
8. To study the product synthesis kinetics of any microorganism

Recommended Books

1. Principles of Fermentation Technology by Stanbury and Whittaker
2. Biotechnology: Food Fermentation by VK Joshi & Ashok Pandey
3. Comprehensive Biotechnology by Moo and young (4 volumes)

Course Outcome:On completing the course, the students will be able to:

CO1: Know various concepts and history of fermentation.

CO2: Know types of fermentation and the classification of microorganisms.

CO3: Understand the growth of microorganism.

CO4: Know the utilization of a fermenter at commercial level.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) Semester V
COURSE CODE: FST – 502
COURSE TITLE: FOOD PACKAGING - I

Time:3 hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Packaging, properties of packaging material, packaging design, packaging containers, structure and properties of different packaging materials, use of metal in packaging, various types of lacquers used

Course Contents:

Theory:

UNIT-I

Packaging Technology: Definitions, functions of packaging. Properties of packaging material in relation to these functions, package design, Tests for flexible packaging materials , different levels of packaging, materials used in packaging, types of containers-primary & secondary, flexible & rigid, hermatic & non hermatic.

UNIT-II

Packaging materials :Wood- structure, types, properties and wooden containers used in packaging, types of wooden boxes

paper and paper board- structure, making, properties ,types and uses of paper and paper board, CFB boxes and their comparison with wooden containers

Glass – composition ,properties,structure,types & manufacture of glass containers, their uses, breakage in glass , closure for glass containers.

UNIT-III

Metals- properties of metals, different metals used in food packaging,steel plate and functions of various constituents of steel, formation of two piece and three piece cans, tinning process, tin free steel, aluminium containers ,lacquering –type and applications, aluminium foil ,corrosion of metal cans.

Practicals:

1. To determine basis weight of paper and paper board
2. To determine thickness of paper and paper board
3. To determine Cobb's value of a paper board
4. To find out the uniformity and amount of wax on wax paper
5. To determine the thermal shock resistance of a glass container
6. To find out the porosity of tin plate.
7. To find out the tin coating weight.
8. To identify the different types of packaging materials

Recommended Books

1. Food Packaging Materials – M. T. Crospy.
2. Food Packaging Materials – M. Mahadevish R.V. Gowramma.
3. Food Packaging – Stanley Sacharow
4. Food Packaging –Principles & Practices _ Gordon L. Robertson
5. A Handbook of Food Packaging, Frank – A – Paine, Heather Y. Paine

Course Outcome:On completing the course, the students will be able to:

CO1: Understand role of packaging in food industry
CO2: Understand about different packaging materials used in food industry
CO3: Learn how different packaging material are manufactured for food industry
CO4: Know about specific packaging material requirement according to the food

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - V
COURSE CODE: FST – 503
COURSE TITLE: CONFECTIONERY & SUGAR TECHNOLOGY

Time: 3 Hours

CREDITS (per week): 03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives

Composition, characteristics and extraction of cane juice, Sugar manufacture, byproducts of sugar industry, deterioration of sugar, preparation of various types of confectionary items.

Course Contents:

Theory:

UNIT-I

Composition and characteristics of cane Juice, Cane Juice extraction. Manufacturing of sugar.

UNIT-II

Deterioration of sugars during storage & transportation and its prevention, By-products of sugar industry and their utilization.

UNIT-III

Classification of confectionary. Hard and soft boiled sugar confectionary: fondant, fudge, caramel, toffee butterscotch, Sugar panning, hard boiled candy.

Practicals:

1. Quality testing of raw as well as finished products of confectionary.
2. Preparation of: 1. candies, 2.caramel 3.toffees.
3. Collection of various types of confectionary packages.
4. Determination of sugar in confectionary product by saccharometer.
5. Determination of refractive index of sugar – solutions of different consistencies.
6. Organoleptic testing of different confectionary products.
7. Visit to sugar and confectionary industry

Recommended Books:

1. Chocolate, Cocoa and Confectionary: Science & Technology by Minife, 1997, AVI Publishing Co., New York.
2. Handbook of Cane Sugar Technology by Mathur RBL, 1986, Oxford & IBH Publishing Co., New Delhi.
3. The Science of Cookie & Cracker Production by Faridi H., 1994, Chapman & Hall, UK.

Course Outcome:On completing the course, the students will be able to:

CO1: Know about composition and properties of cane juice

CO2: Understand manufacturing process of sugar

CO3: Learn about problems encountered during the use of by products from sugar industry.

CO4: Identify various confectionary products available in market

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - V
COURSE CODE: FST – 504
COURSE TITLE: OIL & FAT TECHNOLOGY - I

Time: 3 Hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Nomenclature of oils and fats, their properties, nutrition, extraction process, Problems during storage.

Course Contents:

Theory:

UNIT-I

Introduction to oils and fats and their nomenclature.
Physical and chemical Properties of fats and oils.

UNIT-II

Nutritional importance of oils and fats.
Source and physico-chemical properties of following oils:-

a) Animal – Butter oil, lard and tallow.
b) Plant – Groundnut, Sunflower, Soybean and Coconut oil.

UNIT-III

Extraction of oils/fats.
Problems during storage – rancidity, reversion.

Practicals:

1. To determine moisture content of oilseed
2. To determine FFA of oil
3. Determination of Iodine Value, R.M. Value and Polenske Value
4. To determine Saponification value, anisidine value and peroxide value of oil.
5. Determination of melting point of fats.
6. Detection of sesame oil in vanaspati by furfural test.
7. Detection of adulteration with mineral oil, Cotton seed oil or Ground nut oil.
8. Organoleptic evaluation of fats and oils
9. Visit to vegetable oils industry.

Recommended Books:

1. Food Chemistry by Meyer LH, 2006, CBS Publisher, New Delhi
2. Food Science by Potter NN, 5th Ed, 2006, CBS Publisher, New Delhi
3. Food Oils & Fats: Technology, Utilization and Nutrition by Lawson H, 1995, CBS Publisher, New Delhi.

Course Outcome: :On completing the course, the students will be able to:

CO1: Understand nomenclature and physicochemical properties of oils and fats

CO2: Know about the nutrition involve in oils and fats

CO3: Learn different extraction methods of oils and fats

CO4: Get aware of various storage issues of oils and fats

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)- Semester V
COURSE CODE: FST – 505
COURSE TITLE: PROCESSING OF MILK PRODUCTS - II

Time:3 hours **CREDITS (per week): 03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical: – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective:

Classification, preparation, composition, standards of cheese, paneer, channa, condensed milk, evaporated milk, dried milk, icecream, khoa, indigenous milk products

Course Contents:

Theory:

UNIT-I

Cheese: Classification of cheese. Quality of milk for cheese making.
Preparation method of cheddar cheese.
Paneer and Channa: Manufacturing processes.

UNIT-II

Condensed and evaporated milk: Definition, composition & standards. Condensing operations. **Dried milk products:** Introduction, objects of production, standards and composition.Preparation of dried milk and milk powder by roller and spray drying methods.Packaging and storage.Malted milk powders and infant milk food.

UNIT-III

Ice Cream: Different types of ice creams and their composition. BIS requirements of ice-cream,Ingredients used and their role in processing. Manufacturing process.Defects of ice cream, their causes and remedies.
Indigenous milk products: Kulfi, Srikhand, Lassi and Rabri.

Khoa : Preparation of Khoa, Physico-chemical changes in milk on its conversion into khoa. Shelf life of khoa. BIS and legal standards of different milk products.

Practicals:

1. Preparation of flavored milk.
2. Preparation of Khoa.
3. Preparation of Paneer and Channa.
4. Preparation of common varieties of ice-cream.
5. Visit to different milk plants to learn about milk condensing and drying operations.
6. Visit N.D.R.I., Karnal.

Recommended Books:

1. Outlines of Dairy Technology by Sukumar De,1980, Oxford University Press, UK
2. Milk & Milk Products by Eckles, Combs, Hennery C, and Wiles C,1997, Tata McGraw Hill Publishers,USA.
3. Principles of Dairy Processing by Warner JN, 1976, Wiley Science Publishers, USA

Course Outcome:On completing the course, the students will be able to:

CO1: Know about various types and classes of milk products available in the market

CO2: Learn about the manufacturing methods of different milk products

CO3: Know about various standards of milk products

CO4: Identify various defects that may occur in milk products

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)- Semester VI
COURSE CODE: FST – 601
COURSE TITLE: QUALITY ASSURANCE

Time: 3 Hours

CREDITS (per week): 03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Quality control, quality attributes important in food, texture analysis of food, rheology and viscous nature of food products, Sensory evaluation, sampling techniques, quality evaluation of different food products.

Course Contents:

Theory:

UNIT-I

Introduction: Definition, importance and functions of quality control.

Quality attributes of foods:

Colour- Importance, methods of colour measurement by Munsell colour system, Hunter colour system and spectrophotometer.

Size and shape- Importance, methods of measurement i.e. weight, volume, weight to volume ratio, symmetry, curvature and area.

UNIT-II

Texture: Importance, classification of textural properties, working principles of texture instruments i.e. texture profile analyzer, fruit pressure tester, fibrometer and Kramer shear press.

Rheology and viscosity- Importance, classification of newtonian and non-newtonian fluids.

Sensory evaluation- Definition, importance of sensory evaluation, sensory evaluation tests i.e. Difference tests, Ranking tests and Sensitivity tests.

UNIT-III

Sampling- Definition and importance of sampling in food industry, techniques of sampling – random sampling, purposive sampling and systematic sampling.

Methods of quality assessment of food materials:

Fruits and vegetables: Physical and chemical parameters of fresh fruits and vegetables, quality assessment of canned fruits and vegetables.

Cereals: Physical and chemical parameters to determine quality of wheat flour.

Dairy: Physical and chemical parameters to determine quality of raw, pasteurized milk, butter and skim milk powder.

Eggs: External and internal quality parameters, grading of eggs.

Poultry and Meat: Physical and chemical parameters of poultry and meat.

Practicals:

1. Quality evaluation of milk & milk products.
2. Quality evaluation of cereals.
3. Quality evaluation of fruits and vegetables.
4. Quality evaluation of Oils & Fats.
5. Quality evaluation of Meat & Poultry.
6. Adulterants in milk, cereals, oils & fats and their detection.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.)- Semester VI
COURSE CODE: FST – 601
COURSE TITLE: QUALITY ASSURANCE

Recommended Books:

1. Quality Control for Food Industry by Kramer A, Twigg BA, 1970, AVI Publishers, USA.
2. Handbook of Analysis and Quality Control for Fruits & Veg. Products by Ranganna S, 2nd Ed., 2000, Tata McGraw Hill, New Delhi.
3. Food Science by Potter NN, 5th Ed, 2006, CBS Publishers New Delhi

Course Outcome:On completing the course, the students will be able to:
CO1: Familiarize with concept of food quality and significance in life.
CO2: Understand food quality characteristics and instrumentation involved.
CO3: Know about sampling and sampling methods in food
CO4: Learn about sensory analysis.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VI
COURSE CODE: FST – 602
COURSE TITLE: GRAIN STORAGE

Time: 3hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives

Different infestation of food grains, Problems and deterioration during grain storage, Control of infestation, Toxic contaminats present in food grains, pesticidal residue and permissible limits, role of moisture in causing deterioration of food grains, sanitation and hygienic practices.

Theory :

UNIT-I

General problems of storage.Sources and detection of infestation in stored food grains.

Causes, types and content deterioration in stored food grains and methods to check them.Traditional and modern methods of bag and bulk storage.

UNIT-II

Insect pest of stored grain. Chemical, non chemical and integrated methods of controlling stored grain insect pest.
Toxic contamination in good grains, their ill effects.

UNIT-III

Pesticidal contamination tolerance limits, residue and precautions of safe handling of pesticides.
Cleaning aeration and drying of stored products at farmers, commercial and Govt. levels.

Role of moisture in spoilage of stored grains. Categorization of food grains for storage, Principle of godown sanitation and hygience.

Practicals:

1. To study various insect pests of grains.
2. To study the quality tests for grains.
3. To store the grains and check its shelf life.
4. To study the various pesticides used forgrain storage.
5. To study the effect of moisture on spoilage of grains.
6. Visit to grain storage godowns.

Recommended Books:

1. Introduction of Insect – By Metalf & Lukemann.
2. Pesticides and Pollution – By Mollan.

Course Outcome: :On completing the course, the students will be able to:

CO1: Understand storage problems of food grains
CO2: Learn about the toxicity of food grains and insect infestation
CO3: Beware of sanitation, cleaning and hygiene in food storage
CO4: Know about legal regulations for usage of pesticides

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BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER – VI
COURSE CODE: FST – 603
COURSE TITLE: FOOD PACKAGING-II

Time:3 hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical: – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective

Types and use of plastics in food, their properties, plastic containers, different packaging techniques, various packaging material for various food products, Suitable waste disposal obtained from packaging technology

Course contents:

Theory: **UNIT-I**

Plastics-thermoplastics&thermosets
Polyethylene, polypropylene, polyvinylchloride, polyvinylidinechloride, polyester, polystyrene & polyamide,rubber hydrochloride (properties and uses)
polymerization and processing of plastics-compression moulding, injection moulding, blow moulding, thermoforming and extrusion,coextrusion,calendaring, orientation.

UNIT-II

Plastic containers-bottles, cans, jars, cups, tubes ,cartons, retort pouch, laminates
cellophane –preparation , properties and uses biodegradable plastics
Aseptic packaging, shrink packaging ,gas packaging , vacuum and modified atmosphere packaging

UNIT-III

Techniques & methods used for Packaging of cereals and cereal product, fruits and vegetables & their products , milk and milk products and meat and meat products , beverages Shelf life evaluation of packed products
Food packaging & environment-recycling, composting, thermal treatment& land fill.

Practicals:

1. To determine the sorption isotherm of a given sample of food.
2. Shelf life studies of packaging foods.
3. To determine grease resistance of packaging materials.
4. To see the chemical resistance of packaging material.
5. Determination of water vapour transmission rate of various packaging materials
6. Identification of packaging materials
7. To study the different layers of a laminate
8. Visit to various industries, dealing with food packaging materials like / paper, board and metal cans.

Recommended Books

1. Food Packaging Materials – M. T. Crospy.
2. Food Packaging Materials – M. Mahadevish R.V. Gowramma. Food Packaging – Stanley Sacharow
3. Food Packaging –Principles & Practices _ Gordon L. Robertson
4. A Handbook of Food Packaging, Frank – A – Paine, Heather Y. Paine

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER – VI
COURSE CODE: FST – 603
COURSE TITLE: FOOD PACKAGING-II

Course Outcome:On completing the course, the students will be able to:

CO1: Know about different types of plastics and suitable properties used for foods
CO2: Learn about the technological aspect of packaging material in food industry
CO3: Get knowledge about the various advanced packaging techniques
CO4: Understand eco friendly disposal off packaging materials generated from food industry.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VI
COURSE CODE: FST – 604
COURSE TITLE: SPICES & FLAVOUR TECHNOLOGY

Time: 3 Hours

CREDITS (per week):03
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical: – Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives

Classification, composition, processing of white pepper, cryomilling of spices, spice oleoresin, emulsions, flavoring components, Processing of coffee from cocoa beans, stability of flavors

Course Contents:

Theory:

UNIT-I

Classification & use of spices
Chemical constituents of spices.
Processing of white pepper.
Dehydration products of onion, garlic.

UNIT-II

Cryomilling of spices.
Spice oleoresins and spice emulsion.
Packaging of spices and spice products.
Microbial contamination and insect infestation in spices and its control.

UNIT-III

Classification of flavouring compounds.
Processing of Cocoa and Coffee.
Stability of flavourings.

Practicals:

1. Determination of moisture in ground spices.
2. Determination of total ash in spices.
3. Determination of extraneous matter in spices.
4. Determination of pungency rating (Scoville method) in Red Pepper.
5. Adulteration tests for different spices.
6. Organoleptic evaluation of flavours.
7. Indentification of Saffron by sulphuric – diphenylamine test.

Recommended Books:

1. Handbook of Spices by Peter K.V.2001, Woodhead Publishers, UK.
2. Spices and Condiments by Pruthi, J.S., 1976, NBT India.
3. Spice Statistics by Spices Board 2007, GOI, Cochin.

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BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VI
COURSE CODE: FST – 604
COURSE TITLE: SPICES & FLAVOUR TECHNOLOGY

Course Outcome :On completing the course, the students will be able to:

CO1: Know about various spices, their classification, chemistry involved and processing methods

CO2: To handle the microbial infestation during storage of spices

CO3: Understanding various food flavorings and their stability

CO4: Lean manufacture of coffee from cocoa beans

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VI
COURSE CODE: FST – 605
COURSE TITLE: TECHNOLOGY OF FERMENTED FOODS

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Manufacture of various fermented products from different types of food-Milk, Legume, Fresh produce, meat. Alcoholic beverages.

Course contents:

Theory:

UNIT -I

Introduction: Concept of fermented foods, Scope & development in fermented foods & beverage industry. Benefits of fermented foods,

Fermented milk products :

Curd, Yoghurt, Acidophilic milk, Bulgarian milk, Koumiss and Kefir

UNIT-II

Legume products :

soy sauce, miso, tempeh, idli,

Fruit and Vegetable products:

Sauerkraut, Kimchi, Cucumber pickles,

UNIT-III

Meat products:

Fermented meat sausages.

Alcoholic beverages:

Beer, wine, vinegar,

Practicals :

Preparation of following fermented foods in the laboratory and study their spoilage:
Sauerkraut, Pickles, Cheese, Yoghurt
Idli, Fruit Wine, Dosa

Recommended Books:

1. Industrial-Microbiology by Prescott & Dunn
2. Indigenous fermented foods by Steinkraus

Course Outcomecc:On completing the course, the students will be able to:

CO1: Know about microflora important in preparation of different fermented products

CO2: Learn about manufacturing process of different fermented products

CO3: Understanding changes take place during manufacture of different fermented products

CO4: Be aware of microbiology in different fermented products

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VI
COURSE CODE: FST – 606
COURSE TITLE: IN-PLANT TRAINING 4 WEEKS

Time: 4 weeks **Satisfactory/US**

Learning Objectives

Exposure of students to practical application of food technology help them fetch good job opportunities.

Students will get to know about the expertise they can get in a particular industry

All the students are required to undergo 'In Plant Training' for 4 weeks in a food processing unit after 6th semester's final examinations.

Final degree to the students will be awarded subject to their successfully completing the 'In Plant Training'.

In Plant Training will be evaluated as satisfactory / unsatisfactory internally by the department of the college concerned.

Last date for submission of Training Report: within 1 week after coming from training.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VII
COURSE CODE: FST–701
COURSE TITLE: FOOD SAFETY & FOOD LAWS

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objective:

Importance of food safety, various hazards in food that may compromise food safety, various management tools to improve food safety at various levels. Rules and regulations involved in food business by taking virtue of various food laws

Course contents:

Theory:

UNIT-I

INTRODUCTION TO FOOD SAFETY

Definition, Historical background of food safety, Factors affecting Food Safety, Importance of Safe Foods.

UNIT-II

FOOD HAZARDS OF PHYSICAL, CHEMICAL AND BIOLOGICAL ORIGIN

Introduction, Physical Hazards with common examples, Chemical Hazards (naturally occurring environmental and intentionally added and contaminants due to processing), Seafood and Shell fish poisoning, Microbiological hazards (Bacterial and Fungal).

UNIT-III

FOOD SAFETY MANAGEMENT TOOLS

Prerequisites of food hygiene- GHPs ,GMPs, HACCP**,** TQM - concept and need for quality, Microbiological tests for food safety related to (*Coliforms, Listeria, Staphylococci and Salmonella*) , definition and principles of risk Analysis. Steps involved in implementation of food safety programme. Food safety laws and regulations (FSSAI).New approaches to food safety.

Practicals

1. Detection and estimation of food additives and adulterants.
2. Preparation of HACCP charts for meat industry.
3. Preparation of HACCP charts for dairy industry.
4. Preparation of HACCP charts for fruits and vegetable industry.
5. Preparation of HACCP charts for cereal industry.
6. Analysis of aflatoxins in fungal contaminated food product.
7. Visit to Food Industries.

Recommended Books:

Adam MR and Moss MO Food microbiology New Age International (P) Ltd. ND Jay JM Modern Food Microbiology CBS publishers ND Potter NN Food Science CBS, Publishers ND

Bhunia AK Food borne Microbial Pathogens (Mechanism and Pathogenesis) Food Science text series Springer Food Safety by Ian C Shaw: Publisher Wiley Blackwell

Course outcome:On completing the course, the students will be able to:

CO1: Implement concept of food safety at home level and at commercial level
CO2: Identify different risks associated with food that may compromise food safety
CO3: Learn about safety management tool associated with food
CO4: Beware of legal regulations involved in food safety

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VII
COURSE CODE: FST–702
COURSE TITLE: INDUSTRIAL MICROBIOLOGY

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Various industrially important microorganisms, different types of industrial fermentation, Production of various commercial products using microorganisms, use of by-products for fermentation at industrial level, Recovery and purification of biosynthetic products.

Course Contents:

Theory:

UNIT -I

Introduction, Scope and Historical development of industrial microbiology, Methods of Isolation, Screening, improvement & maintenance of industrially important microorganisms,

UNIT -II

Scale up of fermentations, Different types of industrial fermentors, Substrates for industrial fermentation, Principles and Production of citric acid, lactic acid, amino acids, alcohol for fuel, Single cell protein, enzymes (general) and vitamins (Riboflavin, carotenes and B_{12}),

UNIT -III

Utilization of cheap agricultural by-products/wastes for industrial fermentation, Downstream processing: Centrifugation, filtration, precipitation, extraction, drying, cell disruption

Practicals:

1. Isolation of amylolytic microorganisms from a source
2. Isolation of cellulolytic microorganism from soil
3. Maintenance of industrial microorganisms by various methods
4. Production of lactic acid in the laboratory
5. Production of ethanol in the laboratory
6. Determination of alcohol strength by potassium dichromate method
7. Alcohol determination by specific gravity method

Recommended Books:

1 Industrial-Microbiology by Prescott & Dunn
2 Industrial Microbiology by Casida
3. Principles of Fermentation technology by Stanbury and Whittaker
4. Biotechnology: Food Fermentation by VK Joshi & Ashok Pandey
5. Biotechnology: Food Fermentation by VK Joshi & Ashok Pandey

Course Outcome:On completing the course, the students will be able to:

CO1: Understand the use of microorganisms for making different food products
CO2: Know about various types of fermentation techniques
CO3: Utilize waste material to make useful products using microorganisms
CO4: Be aware of various methods of isolating products and microorganisms for further utilization

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VII
COURSE CODE: FST–703
COURSE TITLE: OIL& FAT TECHNOLOGY-II

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives

Various refining steps involved, hydrogenation, fractionation, physical refining, manufacture of various oil based products,quality evaluation, packaging, storage of oils and fats, utilization of by-products of oil processing plants

Course Contents:

Theory:

UNIT-I

1. Refining: degumming, choice of alkali, batch and continuous refining,
2. Bleaching: choice of adsorbent, batch and continuous bleaching.
3. Deodorization: process parameters : batch and continuous processing

UNIT-II

4. Hydrogenation of oils: mechanism, process parameters and batch processing.
5. Fractionation and winterization of oils.
6. Alternative processing methods: PCT (physical cleaning techniques)

UNIT-III

7. Manufacture of margarine, shortenings, salad dressings & mayonnaise.
8. Quality assessment tests for fats and oils.
9. Packing and storage of fats and oils.
10. Functions of oils and fats in foods processing: Frying, Cooking, Baking.
11. By products of oil processing: soap and lecithin

Practicals:

1. Detection of sesame oil in vanaspati by furfural test.
2. To determine fat, moisture and salt content of margarine and butter.
3. To carry out refining and bleaching of oil in lab
4. To estimate colour of oil.
5. To determine phospholipid content of oils.
6. To perform melting point, SFI on shortenings

Recommended Books:

- Food Chemistry by Meyer LH, 2006, CBS Publisher, New Delhi
- Food Science by Potter NN, 5th Ed, 2006, CBS Publisher, New Delhi
- Food Oils & Fats: Technology, Utilization and Nutrition by Lawson H, 1995, CBS Publisher, New Delhi

Course Outcome:On completing the course, the students will be able to:

CO1: Undertand difffent refining techniques used in oils and fats industry
CO2: Know about advanced technology in refining process
CO3: Quality assessment of fats and oils
CO4: Be aware about packaging requirements of oils and byproducts obtained from oil and fats

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VII
COURSE CODE: FST–704
COURSE TITLE: FOOD ENGINEERING-I

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives

Various units and measurements involved, engineering of dehydration, psychrometric calculations,Various aspects of heat transfer with engineering Involved, heat exchanger and their working, evaporation and filtration techniques.

Course Contents:

THEORY:

UNIT-I

UNITS AND MEASUREMENTS: Brief introduction to dimensions, fundamental units and derived units. Systemsof measurement-fps, cgs, mks, SI units.

DEHYDRATION: Moisture-dry and wet basis, free and bound, critical moisture content and equilibrium moisturecontent, drying theory and drying rate curves, drying time, mechanical drying by using tray dryer, conveyer dryer, rotary dryer, drum dryer, fluidized bed dryer, spray dryer, vacuum dryer, and freeze dryer.

PSYCHROMETRY: Psychrometric properties and psychrometric chart Determination of humidity, relativehumidity, dry bulb temperature, wet bulb temperature and dew point.

UNIT-II

PRINCIPLES OF HEAT TRANSFER: Steady and unsteady heat transfer.

Conductive heat transfer-Fourier's law, thermal conductivity, conduction through rectangular slab, hollow cylinder, spherical shell, composite rectangular wall (series), and composite cylinder.

Convective heat transfer-convective heat transfer coefficient, free and forced convection, overall heat transfer coefficient.

Radiative heat transfer-StefenBoltzman law, Radiative heat transfer in two objects

HEAT EXCHANGERS: Steam injection and steam infusion. Tubular, scrapped surface, plate heat, shell and tube heat exchangers.

UNIT-III

EVAPORATION: Parts of evaporator, single effect and multiple effect evaporator, different types of evaporators,steam economy, design of evaporator, thermal and mechanical vapor recompression system.

FILTRATION: Introduction, filtration theory, types of filtration, filtration equipments-pressure filters and vacuum filter.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VII
COURSE CODE: FST–704
COURSE TITLE: FOOD ENGINEERING-I

Course Outcome:On completing the course, the students will be able to:

CO1: Understand engineering mechanisms involved in food industry

CO2: Apply physical principles to understand food components are processed

CO3: Application of basic mathematical and principles to food processing issues.

CO4: Describe the theories of various techniques: Heat exchange, Dehydration, filtration etc.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VII
COURSE CODE: FST–704
COURSE TITLE: FOOD ENGINEERING-I

Practicals:

- Study of psychometric chart-use and applications.
- Determination of moisture content on wet and dry basis
- Study of dehydration characteristics of different food materials.
- To determine the EMC of a food product.
- To study the working principle of an evaporator.
- Determination of thermal conductivity of a food.
- To study the different modes of heat transfer in foods.
- Shelf life evaluation of a food product.

Recommended books:

- Fundamentals of food engineering by Radha CharanVerma, Sanjay Kumar Jain-Himanshu Publicatios.
- Fundamentals of food processing engineering by Romeo T Taledo, CBS Publications.
- Introduction to food engineering by R Paul Singh and Dennis R Heldman-Academic press London
- Unit operations of chemical engineering by Mccab and Smith, Mcgraw Hill, New Delhi.
- Unit operations of Agriculture Processing by K M Sahay and K K Singh, Vikas Publishers.
- Experimental Methods in food engineering by Rizvi and Mittal, CBS Publishers

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VII
COURSE CODE: FST–705
COURSE TITLE: MALTING & BREWING TECHNOLOGY

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:
Information on barley grain structure, changes in grain on modification for utilisation in beer making, science involved in malt making, detailed beer manufacture process, types of fermentation, types of beers.

Course Contents:
Theory:

UNIT – I

Composition and structure of barley, Preparation and storage of barley for malting Characteristics of barley for malting, Malting operations : Steeping, germination, kilning and modification, Composition of malt.

UNIT – II

Brewing operations, Grinding, Mashing : changes during mashing, Filtration of wort
Sparging and boiling, changes during boiling, Hops, selection of hops, Acidification of mash, Wort cooling.

UNIT – III

Beer manufacturing, Wort production, Fermentation, Pasteurization, Types and characteristics of beer.

Practicals:

1. Determination of moisture content of barley.
2. To determine the seed germination capacity of barley.
3. Determination of % protein content of barley.
4. Determination of amount of husk in barley.
5. Preparation of malt.
6. To determine the length of acrospires.
7. Determination of Total Soluble Solids and Total Solids of malt.
8. Determination of % reducing sugars in malt.

Recommended Books:

1. Malting and Brewing Science Vol. I: Lewis and Young (1981).
2. Malting and Brewing Science Vol. II: Lewis and Young (1982).

Course Outcome:On completing the course, the students will be able to:
CO1: Know about the role of raw material in affecting quality beer
CO2: Understand theVarious operations involved in malt making and beer making
CO3: Learn different modern techniques involved in beer manufacturing
CO4:Know about various biochemical changes that happens during beer manufacture

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BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VIII
COURSE CODE: FST–801
COURSE TITLE: FOOD BIOTECHNOLOGY

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Components of Molecular Biotechnology, Different types of chain reactions, nutrional and functional quality improvement of plants, incorporation of human milk protein in food plant, manipulation of fruit ripening, GMF future trends and risk to human health and environment.

Course Contents:

UNIT-I

Introduction:

Components of Molecular Biotechnology, Recombinant DNA Technology, Restriction Endonucleases, Cloning Vectors, Polymerase Chain Reaction, Ligase chain reaction

UNIT-II

Applications of Food Biotechnology:

Plant Biotechnology for Food Production, Improvement of Plant Nutritional and Functional Quality, Plant Proteins, Lipids, Saturated Fatty Acids, Unsaturated Fatty Acids, Carbohydrates, Plant Vaccines, Milk Proteins, Reconstitution of Human Milk Proteins in Food Plants, Carotenoids, Vitamins, Minerals, Manipulation of Fruit Ripening,

UNIT-III

Genetic Modification of microorganisms and crops:

Genetically modified crops for food production, Future trend of GM crops, Food ingredients, processing aids,dietary supplements derived from GM microorganisms, Risk of GMOs and GM Foods to Human Health and Environment

Practicals:

1. Isolation of DNA from micro-organisms.
2. Isolation of RNA from yeast cells.
3. Colorimetric estimation of DNA.
4. Colorimetric estimation of RNA.
5. Demonstration of PCR.
6. Demonstration of tissue culturing in Lab.
7. Digestion of DNA by Restriction Endonucleases
8. Making & Selection of competent E. coli

Recommended Books:

1. Lopez G.F.G and Canovas G.V.B. Food Science and Food biotechnology CRC press
2. Fundamentals of Food Biotechnology by Byong H. Lee: Wiley VCH
3. Tripathy S. N. Food Biotechnology Dominant Publishers and distributors ND Singh R.P. Biotechnology Central Book depot Allahabad

Course Outcome:On completing the course, the students will be able to:

CO1: Learn basic knowledge about the applications of Biotechnology in the food industry.
CO2: Learn about Components of biotechnology and types of chain reactions
CO3: Be aware of new biotechnological strategies for obtaining and transforming food products.
CO4: Understanding GMP and technology involved, Health risks and environment concern

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VIII
COURSE CODE: FST–802
COURSE TITLE: ENZYMES IN FOOD PROCESSING

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:
Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.
Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.
Course Objectives:
Various enzymes used in food technology, their working mechanisms, function of enzymes in manufacture of various food products, Utilization of various enzymes at commercial level to produce different food products.
Course Contents:
Theory:-

UNIT I

Enzymes– classification, properties and mechanism of enzyme action.

Enzymes for production of maltodextrins and corn syrup solids (liquefaction, saccharification, dextrinization, isomerization for production of high-fructose-corn-syrup).

UNIT II

Enzymes in dairy industry: natural enzymes in milk, lactose intolerance, Role of enzymes in cheese making and whey processing.

Fruit juices: Cell wall degrading enzymes for liquefaction, clarification, debittering and decolourization

Immobilized enzyme technology.

UNIT III

Baking: fungal α-amylase for bread making; maltogenic α-amylases for anti-staling; lipases as dough conditioners.

Meat and meat processing : meat tenderization; egg processing.

Course Outcome:On completing the course, the students will be able to:
CO1: Know the mechanism and classification of enzymes
CO2: Study chemical reactions in different kind of food products.
CO3: Utilize of different enzymes in different food industries commercially.
CO4: In vivo production of enzymes

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VIII
COURSE CODE: FST–802
COURSE TITLE: ENZYMES IN FOOD PROCESSING

Practicals:

1. To study the effect of temperature on enzyme activity.
2. To study the effect of substrate concentration on enzyme activity.
3. Determination of enzyme activity of α-amylase in starch hydrolysis.
4. Determination of lipase activity of lipids.
5. To demonstrate the effects of papain enzymes in meat tenderization.
6. Determination of catalase activity of hydrogen peroxide production.
7. Determination of oxidase activity of given sample.
8. Clarification of juices using enzymes.
9. To determine the adequacy of pasteurization in milk.

Books Recommended:

Flickinger MC & Drew SW. 1999. Encyclopedia of Bioprocess Technology. A Wiley- Inter Science Publ.

Kruger JE. et al. 1987. Enzymes and their Role in Cereal Technology.American Association of Cereal Chemists Inc.

Nagodawithana T & Reed G. 1993.Enzymes in Food Processing.Academic Press.

Tucker GA & Woods LFJ. 1991. Enzymes in Food Processing.

Whitehurst R & Law B. 2002. Enzymes in Food Technology.Blackwell Publ.

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VIII
COURSE CODE: FST–803
COURSE TITLE: FOOD ENGINEERING -II

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Engineering aspect of various food processing techniques like freezing, refrigeration, fluid flow mechanics. Different types of pumps and their working mechanisms, size reduction and screening mechanism

Course Contents:

Theory:-

UNIT-I

REFRIGERATION : Components of Refrigeration system, refrigeration cycle and refrigeration load, primary andsecondary refrigerants.

FREEZING: Direct and indirect contact freezing, freezing time calculation.

UNIT-II

FLUID FLOW: Properties of fluid- density, pressure, surface tension and viscocity.Newtonian and non Newtonian fluids, laminar and turbulent fluid, Reynold's number,

Equation of continuity, Bernoulli's theorem, Poiseuille's equation-viscocity measurement in tube, manometer, flow measuring devices-Pitot tube, Venturimeter, orifice meter.

PUMPS: Definition, classification, positive displacement and centrifugal pumps, factors affecting choice of a pump.

UNIT-III

SIZE REDUCTION: Definition and requirements of size reduction, forces used in size reduction, equipments forsize reduction-crushing rolls, hammer mill, disc attrition mill, buhr mill, tumbling mill- ball and rod mill. Critical speed in a tumbling mill.Modes of operation, energy requirements for comminution of solids- Rittenger's law, Kick's law and Bond's law.

SCREENING: Types of screens-grizzly, trammels, vibrating screens, screen openings, and aperture, perforatedmetal screens and wire mesh screens, factors affecting screening.

Course Outcome:On completing the course, the students will be able to:
CO1: Know about refrigeration system and calculation of freezing at industrial level
CO2: Learn about rheology of food products
CO3: Understand size reduction using different types of mills used in food industry.
CO4: Know working of various equipments used in food industry

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BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VIII
COURSE CODE: FST–803
COURSE TITLE: FOOD ENGINEERING -II

Practicals:

- To calculate the refrigeration load in cold storage plant.
- To determine the freezing time of a food.
- Determination of relative viscosity of a liquid food.
- Determination of coefficient of viscosity.
- Determination of pressure drop by using manometer.
- Determination of flow rate of a liquid.
- To study the working principle and operation of a hammer mill.
- To study the working principle and operation of a ball mill.
- Determination of particle size of given flour sample using Sieve analysis.

Recommended books:

- Fundamentals of food engineering by Radha CharanVerma, Sanjay Kumar Jain-Himanshu Publicatios.
- Fundamentals of food processing engineering by Romeo T Taledo, CBS Publications.
- Introduction to food engineering by R Paul Singh and Dennis R Heldman-Academic press London, UK.
- Unit operations of chemical engineering by Mccab and Smith, Mcgraw Hill, New Delhi.
- Unit operations of Agriculture Processing by K M Sahay and K K Singh, Vikas Publishers.
- Experimental Methods in food engineering by Rizvi and Mittal, CBS Publishers

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER - VIII
COURSE CODE: FST–804
COURSE TITLE: FOOD PLANT LAYOUT

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks:20
Internal Marks: 20

Instructions for Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives

Concept of plant layout, its importance, plant design, selection of construction material for food palnt, process flow chart of various industries, maintenance of machines, layouts of different food plants

Course Contents:

Theory:

UNIT-I

Plant design concepts and general design considerations;

Plant location - location factors and their interaction with plant location, Importance of a plant layout selection of site and layouts of different food industries.

UNIT-II

Selection of building material, selection and planning of manufacturing process and service facilities.Process selection; process flow charts, selection of equipment and machinery; maintenance and replacement, depreciation of machinery.

UNIT-III

Management set up in a plant. Plant layout, layout symbols.

Practicals:

- Preparation of layout and process diagram of potato crisp manufacturing plant.
- Preparation of layout and process diagram of Jam/Marmalade manufacturing plant.
- Preparation of layout and process diagram of Bread making plant.
- Preparation of layout and process diagram of a dairy industry.
- Preparation of layout and process diagram of wine making unit.
- Preparation of layout and process diagram of a modern slaughter house.
- Preparation of layout and process of diagram of a confectionary unit.
- Calculation of depreciation of machinery and processing costs.

Recommended Books:

1. Principle of Food Sanitation by Marriott, 5th Ed., 2006, CBS Publishers, New Delhi.
2. Food Processing Waste Management by Green JH and Kramer A, 1979, AVI Publishers, USA.
3. Food Science by Potter NN, 5th Ed., 2006, CBS Publishers, New Delhi.
4. Plant layout and material handling by Sharma S.C.
5. Plant layout & design by James Moore

Course Outcome :On completing the course, the students will be able to:

CO1: Know about various factors that help design a food plant
CO2: Learn about different types of layouts according to desirability
CO3: Select appropriate machines, process or operations according to food plant desirability
CO4: Understand different managerial set ups for a food plant

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONS.) - SEMESTER – VIII
COURSE CODE: FST–805
COURSE TITLE: FOOD ANALYSIS & INSTRUMENTATION

Time: 3 Hours **CREDITS (per week):03**
Max. Marks: 80
Theory Marks: 40
Practical Marks: 20
Internal Marks: 20

Instructions for the Paper Setters:

Theory: – Question paper will contain eight questions in all and students will be asked to attempt five questions. All questions will carry equal marks. Question no. 1 will be objective type and compulsory.

Practical:– Question Paper will be set with the mutual consent of Internal and External Examiners at the spot.

Course Objectives:

Importance of food analysis, working of various advanced instruments-Spectrophotometer, different types of chromatography, separation techniques, rheological techniques, textural analysis.

Course Contents:

Theory:

UNIT I

Brief introduction and principles: Spectroscopic techniques using UV/Visible, polarimetry, refractometry, microscopic techniques in food analysis (light microscopy).

Electron microscopy: principle and brief introduction to types of electron microscopy (SEM, TEM): application of electron microscopy in food processing.

UNIT II

Principle and working of Column chromatography, Gas chromatography and High Pressure Liquid Chromatography.
Brief introduction and principles to Separation techniques: ultrafiltration and supercritical fluid extraction.

UNIT III

Brief introduction and principles to Special techniques: surface tension; thermal methods in food analysis (Differential scanning colorimetry). Texture analyzer, rheometer, hunterlab, amylograph and farinograph, calorimeter.

Practicals:

1. Sorption isotherms by measuring water activity in any hygroscopic food material (for instance - biscuits/potato chips/coffee powder).
2. Estimation of tannin/phytic acid/ pigments by spectrometric method.
3. Separation of amino acids/coal tar dyes by two dimensional paper chromatography.
4. Separation and identification of carotenoids by column chromatography.
5. Analysis of dietary fibre/glucose by enzymatic method.
6. Demonstration of instruments : GLC, HPLC, Atomic absorption, Flame photometer, Farinograph, UV-Vis spectrophotometer and microscopes.

Recommended Books:

AOAC International. 2003. Official methods of analysis of AOAC International. 17th Ed. Gaithersburg, MD, USA, Association of Analytical Communities.

Kirk RS & Sawyer R. 1991.Pearson's Chemical Analysis of Foods.9th Ed. Longman Scientific & Technical.

Nielsen S. (Eds.). 1994. Introduction to Chemical Analysis of Foods. Jones & Bartlett.

Pomrenz Y & Meloan CE. 1996. Food Analysis - Theory and Practice. 3rd Ed. CBS.

Ranganna S. 2001. Handbook of Analysis and Quality Control for Fruit and Vegetable Products.2nd Ed. Tata-McGraw-Hill.

Course Outcome :On completing the course, the students will be able to:

CO1: Learn about advanced technologies used for analysis of food
CO2: Know the working and applications of different instruments
CO3: Interpret data obtained from instruments quality assessment
CO4: Understand various changes that take place in food during processing using instruments