

**MAHARAJA RANJIT SINGH PUNJAB TECHNICAL
UNIVERSITY, BATHINDA**
[Established by Govt. of Punjab under Punjab Act 5 of 2015
and UGC Act 2 (f) and 12(B)]



AGENDA: 2ND MEETING OF FACULTY OF SCIENCES

MEETING VENUE: COMMITTEE ROOM

DATE: 17-09-2018

TIME: 11:00 A.M.



MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY

DABWALI ROAD, BATHINDA-151001

Established by Govt. of Punjab vide Act No. 5 of 2015, UGC Act 2(f) &12(B)]

DEAN ACADEMIC AFFAIRS

Ph. 8725072488, 0164-2284298

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Ref. No.: DAA/MRSPTU/2018/

Date: 07.9.2018

SUBJECT: 2nd MEETING OF FACULTY OF SCIENCES ON 17.09.2018.

To

1. **Dr. Geeta Hundal,** **Chairperson**
Professor, Deptt. of Chemistry, GNDU, Amritsar,
(9501114469) geetahundal@yahoo.com
2. **Dr. Sandeep Kansal,** **Member**
Professor & Head, Department of Physics,
GZS Campus CET, Dabwali Road Bathinda-151001,
(8725072490) skansal2k1@yahoo.com, head.physics.gzs@gmail.com
3. **Prof. Karanvir Singh,** **Member**
Head, Department of Applied Mathematics, GZS Campus CET, Dabwali Road,
Bathinda – 151001,
(8872211150) karanvirs786@gmail.com
4. **Dr. Seema Sharma,** **Member**
Associate Professor & Head, Department of Chemistry, GZS Campus CET,
Bathinda,
(9417114169, 8725072411) harprit6920@gmail.com
5. **Mr. Sanjay Bhatnagar,** **Member**
Head, Department of Computer Applications, GZS Campus CET, Bathinda,
(8725072319) bhatnagar.sanjay@hotmail.com
6. **Dr. Kawaljit Singh Sandhu,** **Member**
Associate Professor, Department of Food Science and Technology, MRSPTU,
Bathinda,
(9896268539) kawsandhu@rediffmail.com
7. **Dr. Gursharan Singh,** **Member**
Professor, GZS Campus CET, Bathinda,
(8725072488, 9417628270) gursharans82@gmail.com
8. **Dr. J.S. Hundal,** **Member**
Professor, GZS Campus CET, Bathinda,
(8872500251) jshundal@yahoo.com
9. **Dr. R.P. Gupta,** **Member**
Head, Dept. of Bio-Technology, BIS Institute of Sciences and Technology,
(Gagra Campus) Moga-Amritsar Highway, Gagra-142043, Moga, Punjab,
(9878822104) rpgupta1947@gmail.com
10. **Dr. Manoj Bali,** **Member**
Professor, Baba Hira Singh Bhattal Institute of Engineering & technology,
Lehragaga,
(7087000702, 8054644823) drmanojbali@gmail.com
11. **Dr. A.K. Tyagi,** **Member**
Professor, Department of Physics, SBS State Technical Campus,
Ferozepur-152004,
(9463000886) akt@aol.in

- 12. Dr. Archana Gupta,** **Member**
 Professor, Dept. of Physics, Swami Vivekanand Group of Institutes,
 Chandigarh-Patiala Highway, Sector-8, Ramnagar, Banur, Chandigarh-140601,
 (7837300487) director_ac@sviet.ac.in
- 13. Dr. Awdesh Pandey,** **Member**
 Professor, Guru Ram Das Institute of Engg. & Tech. Lehra Bega-151111,
 Barnala Road, Bathinda, Punjab,
 (8146223456) mrawdeshpandey@gmail.com, grdietacademics@gmail.com
- 14. Dr. M.S. Dhanju,** **Member**
 Professor, Dept. of Bio-Technology, BIS Group of Institutions,
 (Gagra Campus) Moga-Amritsar Highway, Gagra-142043, Moga, Punjab,
 (9872208277) mukhtardhanju@gmail.com
- 15. Dr. Virinder Singh,** **Member**
 Professor, Department of Chemistry, Baba Banda Singh Bahadur
 College of Engineering, Fatehgarh Sahib,
 (9914349612) virinder.singh@bbsbec.ac.in
- 16. Dr. Amritbir Singh,** **Member**
 Professor, Department of Mathematics, Baba Banda Singh Bahadur College
 of Engineering, Fatehgarh Sahib,
 (9914241230) amritbir.singh@bbsbec.ac.in
- 17. Dr. Harbax S. Bhatti,** **Member**
 Professor, Department of Mathematics, Baba Banda Singh Bahadur College
 of Engineering, Fatehgarh Sahib,
 (8872035211) hod_as@bbsbec.ac.in, bhattihs100@yahoo.com
- 18. Dr. Jaskaran Singh,** **Member**
 Associate Professor, Department of Mathematics, MIMIT, NH-15,
 Near New Grain Market, Green Field Enclave, District Shri Mukatsar Sahib,
 Malout-152107,
 (9356737037) bhullarjaskarn@rediffmail.com
- 19. Dr. Lalit Sharma,** **Member**
 Associate Professor, Department of Chem., Dept. of Applied Sciences,
 Shaheed Bhagat Singh State Technical Campus, Moga Road (NH-95),
 Ferozepur-152004,
 (9872069500) lalitalalit64@rediffmail.com
- 20. Dr. Anju Sharma,** **Member**
 Assistant Professor, Department of Computer Applications, GZS Campus CET,
 Bathinda,
 (7888874425) phdanju@gmail.com
- 21. Mrs. Rajinder Kaur Sangha,** **Member**
 H.O.D. Fashion Technology, DBFGI, Moga
 (9988255255) rajinderkaursangha@gmail.com
- 22. Dr. Sushil Mittal,** **Member**
 Professor, Department of Chemistry, Thapar University, P.O Box 32, Patiala,
 Pin -147004,
 (0175-2393021, 9815653261) smittal2001@yahoo.com
- 23. Dr. S.S. Bhatia,** **Member**
 Professor, Department of Mathematics, Thapar University, P.O Box 32, Patiala,
 Pin -147004,
 (0175-2393022) ssbhatia@thapar.edu
- 24. Dr. B.S. Bajwa,** **Member**
 Professor, Department of Physics, GND University, Grand Trunk Rd, Off NH 1,
 Amritsar-143005,
 (9914116916) bsbajwa1@gmail.com

- 25. Dr. K.N. Chatterjee,** **Member**
Professor & Head, Fashion & Apparel Engineering Research and Consulting,
The Technological Institute of Textile & Sciences, Birla Colony, Bhiwani,
Haryana-127021
(09255176649) kn.chatterjee@gmail.com
- 26. Dr. Sarbjit Singh Bal,** **Member**
Dean Agriculture, Baba Farid College, Deon, Bathinda
(9501115223) drssbal@yahoo.co.in
- 27. Dr. Gurcharan Kaur,** **Member**
Professor, Department of Biotechnology, GND University, Off NH 1,
Amritsar-143005,
(9815450737) kgurcharan.neuro@yahoo.com

Sir/Madam,

It is to inform you that 2nd **Meeting of Faculty of Sciences** has been scheduled on 17/09/2018 at 11.00 AM in Committee Room of Giani Zail Singh Campus College of Engg., & Tech., Bathinda. You are requested to make it convenient to attend this meeting. TA/Honorarium will be paid as per MRSPTU, Bathinda norms. Detailed agenda is attached.

Note: It is to be noted that while claiming TA for travel by own car/taxi, toll tax receipts on the route are to be attached.

**DEAN ACADEMIC AFFAIRS,
MRSPTU, BATHINDA**

Copy to:

- 1) PA to Vice Chancellor MRSPTU, Bathinda for information to the Vice Chancellor, please
- 2) Registrar, MRSPTU, Bathinda
- 3) Finance Officer, MRSPTU, Bathinda
- 4) Deputy Registrar (A & R).

INDEX - 2nd MEETING OF FACULTY OF SCIENCES (17.9.2018)

INDEX			
ITEM NO.	AGENDA	PAGE NO.	ANNEXURE (PAGES)
02.01	INFORMATION REGARDING 2 ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL HELD ON 26.2.2018	01	I (3-19)
02.02	APPROVAL OF SYLLABI OF UNDER GRADUATE PROGRAMMES	01	II (20-56)
02.03	APPROVAL OF SYLLABI OF POST GRADUATE PROGRAMMES	02	III (57-157)
02.04	APPROVAL OF SYLLABI OF CERTIFICATE PROGRAMMES	02	IV (158-179)
02.05	AUTHORIZATION OF VICE CHANCELLOR, MRSPTU BATHINDA TO TAKE DECISIONS IN CASE OF URGENT MATTERS TO BE RATIFIED LATER ON BY MRSPTU ACADEMIC COUNCIL	02	---

**ITEM NO. 02.01 INFORMATION REGARDING 2ND MEETING OF STANDING
COMMITTEE OF MRSPTU ACADEMIC COUNCIL HELD ON
26.2.2018**

It is for information of the members that 2nd Meeting of Standing Committee of MRSPTU Academic Council was held on 26.2.2018. Minutes of this Meeting are enclosed (**ANNEXURE-I, Pages 03-19**). Syllabi of the Programmes covered in the agenda for 2nd meeting of Standing Committee of Academic Council are also included in the agenda for this meeting.

The Members of Faculty please note it.

**ITEM NO. 02.02 APPROVAL OF SYLLABI OF UNDER GRADUATE
PROGRAMMES**

Syllabi of Under Graduate Programmes have been prepared (**ANNEXURE-II: Pages 20-56**).

TABLE-I		
S.N.	ITEM	PAGE NO.
1	B.Sc. Agriculture Syllabus (Sem 4-5) 2016 Batch onwards	20-33
2	B.Sc. MLS (Sem 5- 6) Syllabus 2016 Batch onwards	34-42
3	B.Sc. Biotechnology (Sem 5-6) Syllabus 2016 Batch onwards	43-51
4	B.Sc. (Hons. School) in Mathematics (Sem-1) Syllabus 2018 Batch onwards	52-56

The matter is placed before the Faculty for deliberation and approval.

ITEM NO. 02.03 APPROVAL OF SYLLABI OF POST GRADUATE PROGRAMMES

Syllabi of Post Graduate Programmes have been prepared (**ANNEXURE-III: Pages 57-157**).

TABLE-II		
S. N.	ITEM	PAGE NO.
1	M.Sc. (Physics) (Sem 1-4) Syllabus 2018 Batch onwards	57-81
2	M.Sc. (Fashion Technology) (Sem 1-4) Syllabus 2016 Batch onwards	82-97
3	M.Sc. (Fashion Technology) (Sem 1-4) Syllabus 2017 Batch onwards	98-120
4	M.Sc. (Food Technology) (Sem 1-4) Syllabus 2018 Batch onwards	121-144
5	BCA-MCA Dual Degree Programme Syllabus (Sem 1-2) 2018 Batch onwards	145-157

The matter is placed before the Faculty for deliberation and approval.

ITEM NO. 02.04 APPROVAL OF SYLLABI OF SKILL CERTIFICATE PROGRAMMES

Syllabi of Skill Certificate Programme has been prepared (**ANNEXURE-IV: Pages 158-179**).

TABLE-II		
S. N.	ITEM	PAGE NO.
1	Skill Certificate in Computer Proficiency Syllabus 2018 Batch onwards	158-179

The matter is placed before the Faculty for deliberation and approval.

ITEM NO. 02.05 AUTHORIZATION OF VICE CHANCELLOR, MRSPTU BATHINDA TO TAKE DECISIONS IN CASE OF URGENT MATTERS TO BE RATIFIED LATER ON BY MRSPTU ACADEMIC COUNCIL.

It is proposed to authorize Vice Chancellor, MRSPTU Bathinda to take decisions in case of urgent matters to be ratified later on by Academic Council, MRSPTU, Bathinda.

NOTE: *Any other Agenda item can be discussed with the permission of the Chair.*

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**



**MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
DABWALI ROAD, BATHINDA-151001**

**Established by Govt. of Punjab Act 5(2015) & Approved u/s 2(f) & 12(b) of UGC Act, 1956
DEAN ACADEMIC AFFAIRS**

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daa.mrsstu@gmail.com

Ref. No.: DAA/MRSPTU/1457

Date: 05.3.2018

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

2nd Meeting of Standing Committee of Academic Council of Maharaja Ranjit Singh Punjab Technical University, Bathinda was held on 26.02.2018 at 11:00 AM in the Committee Room of MRSPTU, Bathinda with Hon'ble Vice Chancellor, MRSPTU in the Chair. The following members were present:

- 1. Dr. (Prof.) Mohan Paul Singh Ishar,** **Chairperson**
Vice-Chancellor, MRSPTU, Bathinda,
vcMrsstu@gmail.com
- 2. Dr. (Prof.) Paramjeet Singh,** **Member**
Dean Faculty (Engineering & Technology),
Former Professor of Chemical Engineering & Former Registrar,
Panjab University Chd., Former Registrar, Adesh University, Bathinda.
H. No. 2921, Phase-7, Mohali.
(Ph. 09814469688) pjsingh8399@gmail.com
- 4. Dr. (Prof.) Parikshat Singh Manhas,** **Member**
School of Hospitality and Tourism Management,
University of Jammu, Jammu.
(Ph. 09419188260) psmanhas@htmail.com
- 5. Dr. (Prof.) Ashish Baldi,** **Member**
Dean Faculty (Pharmacy),
Professor, HOD, Deptt. of Pharmacy, Main Campus, MRSPTU, Bathinda,
(Ph. 08968423848) principal.isfcp@gmail.com, baldiashish@gmail.com
- 6. Campus Director,** **Member**
Giani Zail Singh Campus College of Engineering & Technology,
Bathinda (Constituent College).
(Ph. 08725072488) principalgzscet@yahoo.co.in,
director.gzscet@gmail.com
- 7. Director,** **Member**
Punjab Institute of Technology, Nandgarh,
District Bathinda (Constituent College).
(Ph. 09463936756) drbwssidhu07@gmail.com
- 8. Director,** **Member**
Punjab Institute of Technology, GTB Garh,
District Moga (Constituent College),
(Ph. 09996800758) pitgtb@yahoo.in

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

- | | |
|--|------------------------|
| 9. Director,
Punjab Institute of Technology, Rajpura (Constituent College).
(Ph. 07015112387) dir.pitr@gmail.com, pitrajpura@yahoo.com | Member |
| 10. Dean Academic Affairs,
MRSPTU, Bathinda
(Ph. 08725972488) daa.mrsstu@gmail.com | Member |
| 11. Dean College Development Council,
MRSPTU, Bathinda
(Ph. 08872500259) dir.cd@mrsstu.ac.in | Member |
| 12. Dean R & D,
MRSPTU, Bathinda
(Ph. 08725072492) deanrnd.mrsstu@gmail.com | Member |
| 13. Dean Students Welfare,
MRSPTU, Bathinda
(Ph. 09463000954) drrakeshbansal@gmail.com | Member |
| 14. Dean Planning & Development,
MRSPTU, Bathinda,
(Ph. 09501109002) butasidhu@yahoo.com | Member |
| 15. Controller of Examinations,
MRSPTU, Bathinda
(Ph. 08872211150) coe@mrsstu.ac.in | Member |
| 16. Director,
Internal Quality Assurance Cell, MRSPTRU, Bathinda
(Ph. 09878757562) jyotianupam@yahoo.com | Member |
| 17. Registrar,
MRSPTU, Bathinda, (Ph. 08872500251) reg@mrsstu.ac.in | Member |
| 18. Dr. (Prof.) A.K. Goel,
Professor and Head, Department of Electronics and Communication
Engineering, GZS Campus CET Bathinda
(Ph. 08725072491) ashokkgoel@gmail.com | Special Invitee |
| 19. Dr. (Prof.) Balwinder Singh,
Professor, Department of Mech. Engg. GZS Campus CET Bathinda
(Ph. 08872500275) drbwssidhu07@gmail.com | Special Invitee |
| 20. Dr. (Prof.) Sandeep Kansal,
Professor & Head, Dept. of Applied Physics, GZSCCET, Bathinda
(Ph. 08725072490) skansal@mrsptu.ac.in | Special Invitee |
| 21. Dr. (Prof.) Manjeet Bansal,
Head Deptt. of Civil Engg., GZS Campus CET, Bathinda
(Ph. 8725072480) pushkar5@yahoo.com | Special Invitee |
| 22. Dr. (Prof.) Naresh Kumar Garg,
Professor & Head, GZSCCET, Dabwali Road, Bathinda
(Ph. 8725072422, 9463077886) cse.gzscet@gmail.com | Special Invitee |

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

- | | |
|--|------------------------|
| 23. Dr. (Prof.) Sarbjeet Kaur Bath
Prof. and Head, Deptt. of Electrical Engg., Giani Zail Singh Campus College of Engineering & Technology, Bathinda, Punjab-151001
(Ph. 9463836070, 8725072420) sjkbath77@gmail.com | Special Invitee |
| 24. Dr. (Prof.) Ashish Baldi
Prof. & Head, Department of Pharmaceutical Sciences, MRSPTU, BTI
(Ph. 8725072348) baldiashish@gmail.com | Special Invitee |
| 25. Prof. Karanvir Singh
Head, Department of Applied Mathematics, GZS Campus CET,
Dabwali Road, Bathinda – 151001
(Ph. 8872211150) karanvirs786@gmail.com | Special Invitee |
| 26. Dr. Seema Sharma,
Associate Professor, Deptt. of Applied Chemistry,
GZS Campus CET, Bathinda (Inorganic Chemistry),
(Ph. 9417114169, 8872500279) harprit6920@gmail.com | Special Invitee |
| 27. Ar. Ripu Daman Singh,
Head, GZS Campus CET, Dabwali Road, Bathinda
(Ph. 8725072417, 9815222335) ripu_jatinder@yahoo.co.in . | Special Invitee |
| 28. Dr. Devanand Uttam,
Head of Department, Department of Textile Engg., GZSCCET, Bathinda,
(Ph. 08725072426) textilegzscetbti@gmail.com | Special Invitee |
| 29. Dr. Kawaljit Singh Sandhu,
Associate Professor, Department of Food Science and Technology,
Maharaja Ranjit Singh Punjab Technical University, Bathinda
(Ph. 9896268539) kawsandhu@rediffmail.com | Special Invitee |
| 30. Dr. Suman Kathuria,
GZSCCET, Dabwali Road, Bathinda
(Ph. 8725072428) suman_kathuria@yahoo.co.in | Special Invitee |

At the outset the Chairman informed the members present about the grant of 12(b) status by UGC to MRSPTU within three years of its inception. After that agenda items were taken up one by one and the following decisions were arrived at unanimously after due deliberations in the meeting:

Item No.	Description	Decision Taken
02.01	<p>TO INFORM CONSTITUTION OF ACADEMIC COUNCIL</p> <p>Academic Council has been constituted by the Board of Governors of the MRSPTU vide Agenda Item no. 6.12 in its 6th meeting held on 25.07.2017 for a period of two years from 01.10.17 to 30.09.19. It has been notified vide notification no. Reg/Notification/73/57 dated 05.01.2018 (ANNEXURE-I: Pages 16-17).</p> <p>The Item is placed before the Standing Committee of Academic Council for information please</p>	Noted.

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

<p>02.02</p>	<p>TO INFORM ABOUT DEANS OF FACULTIES</p> <p>Seven Deans of Faculties have been approved by the BoG of MRSPTU for a period of two years from 01.10.17 to 30.09.19 (ANNEXURE-II: Page 18).</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>Faculty</th> <th>Name & Address</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Engg & Technology</td> <td>Prof. (Dr.) Paramjit Singh H. No. 2921, Phase-7, Mohali</td> </tr> <tr> <td>2</td> <td>Pharmacy</td> <td>Prof. (Dr.) Ashish Baldi, Deptt of Pharmaceutical Sc & Tech MRSPTU, Bathinda</td> </tr> <tr> <td>3</td> <td>Sciences</td> <td>Prof. (Dr.) Geeta Hundal, Department of Chemistry Guru Nanak Dev University, Amritsar</td> </tr> <tr> <td>4</td> <td>Commerce & Business Management</td> <td>Prof. (Dr.) Sanjeev Kumar Sharma, University Inst of Applied Mgt Scs, Panjab University, Chandigarh</td> </tr> <tr> <td>5</td> <td>Architecture & Planning</td> <td>Prof. (Dr.) Karamjit Singh Chahal, Department of Architecture Guru Nanak Dev University, Amritsar</td> </tr> <tr> <td>6</td> <td>Hospitality & Tourism Management</td> <td>Prof. (Dr.) Parikshat Singh Manhas, School of Hospitality & Tourism Mgt University of Jammu, Jammu</td> </tr> <tr> <td>7</td> <td>Humanities & Social Studies</td> <td>Prof. (Dr.) Paramjit Singh Judge Department of Sociology Guru Nanak Dev University, Amritsar</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for information please.</p>	S.N.	Faculty	Name & Address	1	Engg & Technology	Prof. (Dr.) Paramjit Singh H. No. 2921, Phase-7, Mohali	2	Pharmacy	Prof. (Dr.) Ashish Baldi, Deptt of Pharmaceutical Sc & Tech MRSPTU, Bathinda	3	Sciences	Prof. (Dr.) Geeta Hundal, Department of Chemistry Guru Nanak Dev University, Amritsar	4	Commerce & Business Management	Prof. (Dr.) Sanjeev Kumar Sharma, University Inst of Applied Mgt Scs, Panjab University, Chandigarh	5	Architecture & Planning	Prof. (Dr.) Karamjit Singh Chahal, Department of Architecture Guru Nanak Dev University, Amritsar	6	Hospitality & Tourism Management	Prof. (Dr.) Parikshat Singh Manhas, School of Hospitality & Tourism Mgt University of Jammu, Jammu	7	Humanities & Social Studies	Prof. (Dr.) Paramjit Singh Judge Department of Sociology Guru Nanak Dev University, Amritsar	<p>Noted.</p>
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1	Engg & Technology	Prof. (Dr.) Paramjit Singh H. No. 2921, Phase-7, Mohali																								
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<p>02.03</p>	<p>TO APPROVE COMPOSITION OF FACULTIES</p> <p>The composition of seven faculties has been proposed for a period of two years from 01.10.17 to 30.09.19. (ANNEXURE-III: Pages 19-33).</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>Faculty</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Engineering & Technology</td> </tr> <tr> <td>2</td> <td>Pharmacy</td> </tr> <tr> <td>3</td> <td>Sciences</td> </tr> <tr> <td>4</td> <td>Commerce & Business Management</td> </tr> </tbody> </table>	S.N.	Faculty	1	Engineering & Technology	2	Pharmacy	3	Sciences	4	Commerce & Business Management	<p>Approved.</p>														
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**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

	<table border="1"> <tr> <td>5</td> <td>Architecture & Planning</td> </tr> <tr> <td>6</td> <td>Hospitality & Tourism Management</td> </tr> <tr> <td>7</td> <td>Humanities & Social Studies</td> </tr> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	5	Architecture & Planning	6	Hospitality & Tourism Management	7	Humanities & Social Studies																																													
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02.04	<p>TO APPROVE COMPOSITION OF BOARDS OF STUDIES</p> <p>24-Boards of Studies have been proposed for a period of two years from 01.10.17 to 30.09.19. (ANNEXURE-IV: Pages 34-88).</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>Board of Studies</th> </tr> </thead> <tbody> <tr><td>1</td><td>Architecture & Planning</td></tr> <tr><td>2</td><td>Agriculture Engineering</td></tr> <tr><td>3</td><td>Agriculture Sciences</td></tr> <tr><td>4</td><td>Biotechnology</td></tr> <tr><td>5</td><td>Chemical Engineering</td></tr> <tr><td>6</td><td>Chemistry</td></tr> <tr><td>7</td><td>Civil Engineering</td></tr> <tr><td>8</td><td>Commerce and Business Management</td></tr> <tr><td>9</td><td>Computer Applications</td></tr> <tr><td>10</td><td>Computer Science & Engineering</td></tr> <tr><td>11</td><td>Electrical & Electronics Engineering</td></tr> <tr><td>12</td><td>Electrical Engineering</td></tr> <tr><td>13</td><td>Electronics Engineering</td></tr> <tr><td>14</td><td>Environmental Science & Technology</td></tr> <tr><td>15</td><td>Food Science & Technology</td></tr> <tr><td>16</td><td>Hospitality & Tourism Management</td></tr> <tr><td>17</td><td>Humanities & Social Studies</td></tr> <tr><td>18</td><td>Information Technology</td></tr> <tr><td>19</td><td>Marine Engineering</td></tr> <tr><td>20</td><td>Mathematics</td></tr> <tr><td>21</td><td>Mechanical Engineering</td></tr> <tr><td>22</td><td>Pharmacy</td></tr> <tr><td>23</td><td>Physics</td></tr> <tr><td>24</td><td>Textile Engineering</td></tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	S.N.	Board of Studies	1	Architecture & Planning	2	Agriculture Engineering	3	Agriculture Sciences	4	Biotechnology	5	Chemical Engineering	6	Chemistry	7	Civil Engineering	8	Commerce and Business Management	9	Computer Applications	10	Computer Science & Engineering	11	Electrical & Electronics Engineering	12	Electrical Engineering	13	Electronics Engineering	14	Environmental Science & Technology	15	Food Science & Technology	16	Hospitality & Tourism Management	17	Humanities & Social Studies	18	Information Technology	19	Marine Engineering	20	Mathematics	21	Mechanical Engineering	22	Pharmacy	23	Physics	24	Textile Engineering	Approved.
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**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

02.05	TO APPROVE UNDER GRADUATE SYLLABI		These syllabi be put up before the concerned Faculty for consideration and approval.	
	Under graduate syllabi as detailed below have been proposed (ANNEXURE-V: Pages 89-771).			
	S.N.	Under Graduate Syllabi		Page No
	1	B.Sc. (Agriculture) 4 th Sem. 2016 Batch onwards		89-95
	2	B.Sc. (Medical Lab. Science) 5 th – 6 th Sem. 2016 Batch onwards		96-104
	3	B.Tech. (Civil Engg.) 5 th – 8 th Sem. 2016 Batch onwards		105-131
	4	B.Tech. (Automobile Engg.) 3 rd – 6 th Sem. 2016 Batch onwards		132-162
	5	B.Tech. (Electrical & Electronics Engg.) 5 th – 6 th Sem. 2016 Batch onwards		163-186
	6	B.Tech. (Electronics & Communications Engg.) 3 rd – 8 th Sem. 2016 Batch onwards		187-246
	7	B.Tech. (Electronics & Telecommunications Engg.) 3 rd – 8 th Sem. 2016 Batch onwards		247-306
	8	B.Tech. (Electronics & Instrumentation Engg.) 3 rd – 8 th Sem. 2016 Batch onwards		307-359
	9	B.Tech. (Information Technology) 5 th – 6 th Sem. 2016 Batch onwards		360-377
	10	B.Tech. (Marine Engg.) 3 rd – 6 th Sem. 2016 Batch onwards		378-408
	11	Bachelor of HMCT 3 rd – 4 th Sem. 2016 Batch onwards		409-426
	12	Bachelor of Management Studies (Airlines, Tourism and Hospitality) Sem. 1 st – 2 nd 2017 Batch onwards		427-437
	13	Bachelor of Management Studies (Airlines, Tourism and Hospitality) Sem. 1 st – 6 th 2016 Batch		438-458
	14	Bachelor of Management Studies (HMCT) Sem. 1 st – 6 th 2016 Batch onwards		459-522
	15	Soft Skills I-IV		523-526
	16	UG Open Electives-I 2016 Batch onwards		527-536
	17	UG Open Electives-II 2016 Batch onwards		537-545
18	UG Open Electives-III 2016 Batch onwards	546-549		
19	Bachelor of Hotel Management & Catering Technology Sem. 1 st – 8 th	550-620		

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

	<table border="1"> <tr> <td></td> <td>updated on 17.2.18 for 2016 Batch onwards</td> <td></td> </tr> <tr> <td>20</td> <td>B.Tech. (Electrical Engg.) 5th – 6th Sem. updated on 16.2.18 for 2016 Batch onwards</td> <td>621-660</td> </tr> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>		updated on 17.2.18 for 2016 Batch onwards		20	B.Tech. (Electrical Engg.) 5 th – 6 th Sem. updated on 16.2.18 for 2016 Batch onwards	621-660																									
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20	B.Tech. (Electrical Engg.) 5 th – 6 th Sem. updated on 16.2.18 for 2016 Batch onwards	621-660																														
02.06	<p>TO APPROVE POST GRADUATE SYLLABI</p> <p>Post graduate syllabi have been proposed (ANNEXURE-VI: Pages 772-956).</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>Post Graduate Syllabi</th> <th>Page No</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>M.Sc. (Fashion Technology) Sem. 1st – 4th 2016 Batch</td> <td>772-788</td> </tr> <tr> <td>2</td> <td>M.Sc. (Fashion Technology) Sem. 1st – 4th 2017 Batch onwards</td> <td>789-813</td> </tr> <tr> <td>3</td> <td>M.Tech. ECE (Microelectronics) Sem. 1st – 4th 2016 Batch onwards</td> <td>814-837</td> </tr> <tr> <td>4</td> <td>M.Tech ECE Sem. 1st – 4th 2016 Batch onwards</td> <td>838-862</td> </tr> <tr> <td>5</td> <td>M.Tech. (Production Engineering) Sem. 1st – 4th 2016 Batch onwards</td> <td>863-883</td> </tr> <tr> <td>6</td> <td>PG Open Electives-I 2016 Batch onwards</td> <td>884-909</td> </tr> <tr> <td>7</td> <td>PG Open Electives-II 2016 Batch onwards</td> <td>910-932</td> </tr> <tr> <td>8</td> <td>M.Sc. (Food Technology) 2018 Batch onwards</td> <td>933-955</td> </tr> <tr> <td>9</td> <td>PG Open Electives 2018 Batch onwards</td> <td>956-957</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	S.N.	Post Graduate Syllabi	Page No	1	M.Sc. (Fashion Technology) Sem. 1 st – 4 th 2016 Batch	772-788	2	M.Sc. (Fashion Technology) Sem. 1 st – 4 th 2017 Batch onwards	789-813	3	M.Tech. ECE (Microelectronics) Sem. 1 st – 4 th 2016 Batch onwards	814-837	4	M.Tech ECE Sem. 1 st – 4 th 2016 Batch onwards	838-862	5	M.Tech. (Production Engineering) Sem. 1 st – 4 th 2016 Batch onwards	863-883	6	PG Open Electives-I 2016 Batch onwards	884-909	7	PG Open Electives-II 2016 Batch onwards	910-932	8	M.Sc. (Food Technology) 2018 Batch onwards	933-955	9	PG Open Electives 2018 Batch onwards	956-957	<p>These syllabi be put up before the concerned Faculty for consideration and approval.</p>
S.N.	Post Graduate Syllabi	Page No																														
1	M.Sc. (Fashion Technology) Sem. 1 st – 4 th 2016 Batch	772-788																														
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8	M.Sc. (Food Technology) 2018 Batch onwards	933-955																														
9	PG Open Electives 2018 Batch onwards	956-957																														
02.07	<p>TO APPROVE B.TECH. 1ST YEAR 2018 BATCH STUDY SCHEME & SYLLABUS AS PER GUIDELINES OF AICTE</p> <p>It is proposed to adopt B.Tech. 1st Year 2018 Batch Study Scheme & Syllabus as per guidelines of AICTE with small modifications, wherever necessary (ANNEXURE-VII: Pages 958-979).</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	<p>This syllabus be put up in the meeting of Chairpersons of the concerned Boards of Studies.</p>																														

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

<p>02.08</p>	<p>TO APPROVE STARTING OF NEW PROGRAMMES IN DEPARTMENT OF PHARMACEUTICAL SCIENCES & TECHNOLOGY AT MRSPTU MAIN CAMPUS</p> <p>It is proposed to start the following Programmes in Department of Pharmaceutical Science & Technology at MRSPTU Main Campus from the Academic Session 2018-19 (ANNEXURE-VIII: Page 980).</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Programmes</th> <th>Annual Intake</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>B.Pharm.</td> <td>60</td> </tr> <tr> <td>2.</td> <td>M.Sc. Clinical Research</td> <td>60</td> </tr> <tr> <td>3.</td> <td>M.Sc. Biotechnology</td> <td>60</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	S. No.	Programmes	Annual Intake	1.	B.Pharm.	60	2.	M.Sc. Clinical Research	60	3.	M.Sc. Biotechnology	60	<p>1. B.Pharm. was approved with effect from 2018-19 session for 60 seats</p> <p>2. M.Sc. in Clinical Research was approved with effect from 2018-19 session for 15 seats</p> <p>3. M.Sc. Biotechnology was approved with effect from 2019-20 session for 15 seats</p>
S. No.	Programmes	Annual Intake												
1.	B.Pharm.	60												
2.	M.Sc. Clinical Research	60												
3.	M.Sc. Biotechnology	60												
<p>02.09</p>	<p>TO APPROVE STARTING OF NEW PROGRAMMES IN DEPARTMENT OF FOOD SCIENCE & TECHNOLOGY AT MRSPTU MAIN CAMPUS</p> <p>It is proposed to start the following Programmes in Department of Food Science & Technology at MRSPTU Main Campus from the Academic Session 2018-19 (ANNEXURE-IX: Page 981).</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Programmes</th> <th>Annual Intake</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>M.Sc. Food Technology</td> <td>30</td> </tr> <tr> <td>2.</td> <td>B.Sc. Food Technology</td> <td>30</td> </tr> <tr> <td>3.</td> <td>B.Sc. Home Science</td> <td>30</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	S. No.	Programmes	Annual Intake	1.	M.Sc. Food Technology	30	2.	B.Sc. Food Technology	30	3.	B.Sc. Home Science	30	<p>MSc in Food Technology was approved with effect from 2018-19 session with 30 seats in Science faculty.</p>
S. No.	Programmes	Annual Intake												
1.	M.Sc. Food Technology	30												
2.	B.Sc. Food Technology	30												
3.	B.Sc. Home Science	30												
<p>02.10</p>	<p>B.Sc. (Hons.) PHYSICS, B.Sc. (Hons.) CHEMISTRY & B.Sc. (Hons.) MATHEMATICS AT MRSPTU MAIN CAMPUS</p> <p>It is proposed to start the following Programmes in Department of Physics, Chemistry & Mathematics at MRSPTU Main Campus from the Academic Session 2018-19 (ANNEXURE-X: Page 982).</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Programmes</th> <th>Annual Intake</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>B.Sc. (Hons.) in Physics</td> <td>60</td> </tr> <tr> <td>2.</td> <td>B.Sc. (Hons.) in Chemistry</td> <td>60</td> </tr> <tr> <td>3.</td> <td>B.Sc. (Hons.) in Mathematics</td> <td>60</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please</p>	S. No.	Programmes	Annual Intake	1.	B.Sc. (Hons.) in Physics	60	2.	B.Sc. (Hons.) in Chemistry	60	3.	B.Sc. (Hons.) in Mathematics	60	<p>1. B.Sc. (Hons. School) in Mathematics was approved with effect from 2018-19 session with 60 seats.</p> <p>2. B.Sc. (Hons. School) in Physics and Chemistry were deferred.</p>
S. No.	Programmes	Annual Intake												
1.	B.Sc. (Hons.) in Physics	60												
2.	B.Sc. (Hons.) in Chemistry	60												
3.	B.Sc. (Hons.) in Mathematics	60												

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

<p>02.11</p>	<p>TO APPROVE STARTING OF NEW PROGRAMMES AT ARCHITECTURE DEPARTMENT GZSCCET, BATHINDA</p> <p>It is proposed to start the following Programmes at GZSCCET Bathinda from the Academic Session 2018-19 (ANNEXURE-XI: Pages 983-991).</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>Programmes</th> <th>Annual Intake</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>B. Planning (4 Yrs.)</td> <td>30</td> </tr> <tr> <td>2.</td> <td>M. Planning</td> <td>18</td> </tr> <tr> <td>3.</td> <td>M.Arch. (Building Engg. & Management)</td> <td>18</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	S.N.	Programmes	Annual Intake	1.	B. Planning (4 Yrs.)	30	2.	M. Planning	18	3.	M.Arch. (Building Engg. & Management)	18	<ol style="list-style-type: none"> 1. B.Planning (4 yrs) was approved w.e.f. 2018-19 session with 15 seats 2. M.Planning and M.Arch. (Building Engg. & Management) was approved w.e.f. 2018-19 session with 18 seats each 3. Head Archi shall take care of the modalities required 						
S.N.	Programmes	Annual Intake																		
1.	B. Planning (4 Yrs.)	30																		
2.	M. Planning	18																		
3.	M.Arch. (Building Engg. & Management)	18																		
<p>02.12</p>	<p>TO APPROVE STARTING OF NEW PROGRAMMES AT PIT RAJPURA</p> <p>It is proposed to start the following Programmes at PIT Rajpura from the Academic Session 2018-19 (ANNEXURE-XII: Page 992).</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>Programmes</th> <th>Annual Intake</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>B.Tech. Computer Science & Engineering</td> <td>60</td> </tr> <tr> <td>2.</td> <td>Skill Certificate Course in Computer Maintenance and Programming Assistant</td> <td>60</td> </tr> <tr> <td>3.</td> <td>B.Tech. Computer Science & Engineering (LEET) for 2018 Batch only</td> <td>60</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	S.N.	Programmes	Annual Intake	1.	B.Tech. Computer Science & Engineering	60	2.	Skill Certificate Course in Computer Maintenance and Programming Assistant	60	3.	B.Tech. Computer Science & Engineering (LEET) for 2018 Batch only	60	<ol style="list-style-type: none"> 1. B.Tech. (CSE) along with LEET was approved w.e.f. 2018-19 session for 60 seats 2. Skill Certificate Course in Computer Maintenance and Programming Assistant was approved w.e.f. 2018-19 session for 60 seats. 						
S.N.	Programmes	Annual Intake																		
1.	B.Tech. Computer Science & Engineering	60																		
2.	Skill Certificate Course in Computer Maintenance and Programming Assistant	60																		
3.	B.Tech. Computer Science & Engineering (LEET) for 2018 Batch only	60																		
<p>02.13</p>	<p>TO APPROVE STARTING OF NEW PROGRAMMES AT PIT NANDGARH</p> <p>It is proposed to start the following Programmes at PIT Nandgarh from the Academic Session 2018-19 (ANNEXURE-XIII: Page 993).</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>Programmes</th> <th>Annual Intake</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>B.Sc. Agriculture (Hons.) (4 Yrs.)</td> <td>60</td> </tr> <tr> <td>2.</td> <td>B.Sc. (Non-Medical)</td> <td>60</td> </tr> <tr> <td>3.</td> <td>Skill Certificate Course in Welding</td> <td>30</td> </tr> <tr> <td>4.</td> <td>Skill Certificate Course in Plumbing</td> <td>30</td> </tr> <tr> <td>5.</td> <td>Skill Certificate Course in Computer Maintenance and Programming Assistant</td> <td>60</td> </tr> </tbody> </table>	S.N.	Programmes	Annual Intake	1.	B.Sc. Agriculture (Hons.) (4 Yrs.)	60	2.	B.Sc. (Non-Medical)	60	3.	Skill Certificate Course in Welding	30	4.	Skill Certificate Course in Plumbing	30	5.	Skill Certificate Course in Computer Maintenance and Programming Assistant	60	<p>Approved for B.Sc. Non-Medical for 60-seats along with Skill Certificate Courses in Welding and Plumbing for 30-seats each along with Skill Certificate Course in Computer Maintenance & Programming Asstt for 60-seats w.e.f. 2018-19</p>
S.N.	Programmes	Annual Intake																		
1.	B.Sc. Agriculture (Hons.) (4 Yrs.)	60																		
2.	B.Sc. (Non-Medical)	60																		
3.	Skill Certificate Course in Welding	30																		
4.	Skill Certificate Course in Plumbing	30																		
5.	Skill Certificate Course in Computer Maintenance and Programming Assistant	60																		

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

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02.14	<p>TO APPROVE STARTING OF NEW PROGRAMMES AT PIT GTB GARH MOGA</p> <p>It is proposed to start the following Programmes at PIT GTB Garh from the Academic Session 2018-19 (ANNEXURE-XIV: Page 994).</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>Programmes</th> <th>Annual Intake</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>BBA</td> <td>60</td> </tr> <tr> <td>2.</td> <td>BCA</td> <td>60</td> </tr> <tr> <td>3.</td> <td>B.Sc. (Non-Medical)</td> <td>60</td> </tr> <tr> <td>4.</td> <td>B.Sc. Agriculture (Hons.) (4 Yrs.)</td> <td>60</td> </tr> <tr> <td>5.</td> <td>Skill Certificate Course in Computer Maintenance and Programming Assistant</td> <td>60</td> </tr> <tr> <td>6.</td> <td>Skill Certificate Course in Electrician</td> <td>30</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	S.N.	Programmes	Annual Intake	1.	BBA	60	2.	BCA	60	3.	B.Sc. (Non-Medical)	60	4.	B.Sc. Agriculture (Hons.) (4 Yrs.)	60	5.	Skill Certificate Course in Computer Maintenance and Programming Assistant	60	6.	Skill Certificate Course in Electrician	30	Approved for BBA & BCA for 60 seats each along with Skill certificate Course in Computer Maintenance & Programming Asstt for 60-seats w.e.f. 2018-19
S.N.	Programmes	Annual Intake																					
1.	BBA	60																					
2.	BCA	60																					
3.	B.Sc. (Non-Medical)	60																					
4.	B.Sc. Agriculture (Hons.) (4 Yrs.)	60																					
5.	Skill Certificate Course in Computer Maintenance and Programming Assistant	60																					
6.	Skill Certificate Course in Electrician	30																					
02.15	<p>TO APPROVE ACADEMIC CALENDER-2018</p> <p>The Academic Calendar-2018 has been proposed (ANNEX-XV: Page 995).</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	Approved.																					
02.16	<p>TO APPROVE HOLIDAYCALENDER-2018</p> <p>The Holiday Calendar-2018 has been proposed (Annexure-XVI: Pages 996-998).</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	Approved.																					
02.17	<p>TO APPROVE SIGNING OF MoU/AGGREMENT BY MRSPTU</p> <p>The University has entered into MoU/Agreement (Annexure-XVII A: Pages 999-1059) with following Universities/Organizations,</p> <table border="1"> <thead> <tr> <th>S.N.</th> <th>MoU/Agreement</th> <th>Page No.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Wayne State University Detroit, Michigan, USA, Part-1, 2, 3</td> <td>999-1016</td> </tr> <tr> <td>2</td> <td>Thompson Rivers University, Kamloops, BC, Canada</td> <td>1017-1026</td> </tr> <tr> <td>3</td> <td>CALYXPOD, Josh Technology Group, Gurgaon, India</td> <td>1027-1032</td> </tr> </tbody> </table>	S.N.	MoU/Agreement	Page No.	1	Wayne State University Detroit, Michigan, USA, Part-1, 2, 3	999-1016	2	Thompson Rivers University, Kamloops, BC, Canada	1017-1026	3	CALYXPOD, Josh Technology Group, Gurgaon, India	1027-1032	Noted. It was further decided that for every MoU/Agreement there shall be a Nodal Officer who shall be responsible for its effective implementation. He/She shall communicate with the colleges the advantages & highlights of these MoU/									
S.N.	MoU/Agreement	Page No.																					
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**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

	<table border="1"> <tr> <td>4</td> <td>Central Tool Room, Ludhiana, India</td> <td>1033-1035</td> </tr> <tr> <td>5</td> <td>Red Hat India Private Limited, Mumbai</td> <td>1036-1049</td> </tr> <tr> <td>6</td> <td>Skills Anytime, Chandigarh of bksb India Pvt. Limited, a Subsidiary of bksb Limited, United Kingdom</td> <td>1050-1056</td> </tr> <tr> <td>7</td> <td>'Truechip' Solutions Pvt. Ltd., Noida, The Verification IP Specialist</td> <td>1057-1059</td> </tr> <tr> <td>8</td> <td>TiE Chandigarh Fostering Entrepreneurship, Chandigarh (Annexure-XVII B: Pages 1060-1063)</td> <td>1060-1063</td> </tr> <tr> <td>9</td> <td>Centex International Pvt. Limited (Annexure-XVII C: Pages 1064-65)</td> <td>1064-1065</td> </tr> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please</p>	4	Central Tool Room, Ludhiana, India	1033-1035	5	Red Hat India Private Limited, Mumbai	1036-1049	6	Skills Anytime, Chandigarh of bksb India Pvt. Limited, a Subsidiary of bksb Limited, United Kingdom	1050-1056	7	'Truechip' Solutions Pvt. Ltd., Noida, The Verification IP Specialist	1057-1059	8	TiE Chandigarh Fostering Entrepreneurship, Chandigarh (Annexure-XVII B: Pages 1060-1063)	1060-1063	9	Centex International Pvt. Limited (Annexure-XVII C: Pages 1064-65)	1064-1065	Agreements.
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02.18	<p>TO INFORM INCLUSION OF MRSPTU IN LIST OF UNIVERSITIES UNDER SECTION 12(B) OF UGC ACT 1956</p> <p>UGC has granted 12(B) status to University vide letter no. 9-11/2015 (CPP-I/PU) dated 3.1.2018 (Annexure-XVIII: Page 1066).</p> <p>The Item is placed before the Standing Committee of Academic Council for information please.</p>	Noted. It was further decided that the constituted grant committee shall do the necessary presentation cum motivations to all the depts of GZSCCET, and Univ Main Campus, regarding the benefits of 12(B) status and how to get financial assistance from Central Funding agencies in the 1 st phase																		
02.19	<p>TO INFORM Ph.D. CANDIDATES ENROLLED/REGISTERED WITH MRSPTU UP TO 31.12.2017</p> <p>The detailed list of Ph.D. candidates enrolled/registered with MRSPTU, Bathinda up to 31.12.2017 under various Disciplines is appended (ANNEXURE-XIX: Pages 1067-1071). The same stands uploaded on MRSPTU web-site also as per the UGC format.</p> <p>The Item is placed before the Standing Committee of Academic Council for information please.</p>	Noted.																		
02.20	<p>TO RATIFY MINUTES OF DDRC'S MEETINGS HELD IN VARIOUS DISCIPLINES</p> <p>To address research related issues at Ph.D. level in various Disciplines under different Faculties of MRSPTU, Department Doctoral Research Committees have met from time to time. Minutes of these meetings are appended (ANNEXURE-XX: Pages 1072-1092).</p>	Ratified.																		

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

	<p>The Item is placed before the Standing Committee of Academic Council for information please.</p>	
02.21	<p>TO INFORM MRSPTU Ph.D. REGULATIONS-2016 WITH AMENDMENT</p> <p>As per the provisions contained in UGC (Minimum Standards and Procedures for Award of M.Phil./Ph.D. Degree) Regulations, 2016, MRSPTU has modified its Ph.D. Regulations-2015 and notified the modified MRSPTU Ph.D. Regulations-2016 vide DAA/MRSPTU/Notification/20 dated 23.11.2017 and Amendment in Ph.D. Regulation 2016 in Clause No. 4.1 (ii) vide DAA/MRSPTU/Notification/22 dated 22.1.2018 (ANNEXURE-XXI: Pages 1093-1121).</p> <p>The Item is placed before the Standing Committee of Academic Council for information please.</p>	Noted.
02.22	<p>TO APPROVE ‘INFORMATION TECHNOLOGY’ AS ONE OF THE SPECIALIZATIONS IN MBA FOR UNIVERSITY MAIN CAMPUS, CONSTITUENT & AFFILIATED COLLEGES</p> <p>It is proposed to include ‘Information Technology’ as one of the specializations in MBA for University Main Campus, Constituent & Affiliated Colleges (ANNEXURE-XXII: Pages 1122-1123).</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	<ol style="list-style-type: none"> 1. ‘Information Technology’ as one of the specialization in MBA was approved. 2. It was further decided to start MBA in Hospitality and Tourism Mgt (MBHT) with 30 seats. (For this purpose, the BOS in Commerce & Mgt and Hospitality & Tourism Mgt will work together.
02.23	<p>TO INCLUDE MATH-III, MATH-IV AS THE CORE SUBJECTS OF B. TECH., ESPECIALLY B.TECH. MECH., ELECTRICAL, ECE and CSE& TO INCLUDE NUMERICAL METHODS IN 5th SEMESTER OF B.TECH. MECHANICAL AND ELECTRICAL</p> <p>It is proposed to include Math-III, Math-IV as the core subjects of B. Tech, especially B. Tech. Mechanical, Electrical, ECE and CSE from the Academic Session 2018-19. Further, it is proposed to include Numerical Methods in 5th semester of B. Tech. Mechanical and Electrical (ANNEXURE-XXIII: Page 1124).</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	It was decided that Math-III, Math-IV and Numerical Methods may be offered/included as departmental electives in B. Tech for batches admitted on or before 2017

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

<p>02.24</p>	<p>PROPOSAL TO MAKE PUNJAB STATE AERONAUTICAL ENGINEERING COLLEGE (PSAEC), PATIALA, A CONSTITUENT COLLEGE OF THE UNIVERSITY</p> <p>A proposal to make Punjab State Aeronautical Engineering College (PSAEC), Patiala, a Constituent College of the University has been received by the University from the Govt. of Punjab. Chief Principal Secretary to Hon'ble Chief Minister convened a meeting with Additional Chief Secretary, Department of Technical Education & Industrial Training, Secretary, Civil Aviation and CEO, PSCAC in this regard. It was proposed to make PSAEC a Constituent College of MRSPTU, Bathinda subject to the approval of the Hon'ble Chief Minister for being the Civil Aviation Minister and also Chairman, Punjab State Civil Aviation Council (ANNEXURE-XXIV: Pages 1125-1130).</p> <table border="1"> <thead> <tr> <th>S. N.</th> <th>Programme</th> <th>Annual Intake</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>B.Tech. Aeronautical Engg.</td> <td>60</td> </tr> <tr> <td>2.</td> <td>B.Sc. (Hons.) Aircraft Maintenance</td> <td>60</td> </tr> </tbody> </table> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	S. N.	Programme	Annual Intake	1.	B.Tech. Aeronautical Engg.	60	2.	B.Sc. (Hons.) Aircraft Maintenance	60	<p>Noted.</p>
S. N.	Programme	Annual Intake									
1.	B.Tech. Aeronautical Engg.	60									
2.	B.Sc. (Hons.) Aircraft Maintenance	60									
<p>02.25</p>	<p>TO INFORM THE STARTING OF SWAYAM PRABHA DISH CHANNELS IN GZSCCET, BATHINDA DEPARTMENTS</p> <p>It is to inform that SWAYAM Prabha Dish Channels in GZSCCET, Bathinda (Constituent College) Departments have been started in 11 Departments of GZSCCET, Bathinda (ANNEXURE-XXV: Page 1131). Students are being motivated and registered for self-paced SWAYAM MOOCS.</p> <p>The Item is placed before the Standing Committee of Academic Council for information please.</p>	<p>Noted.</p>									
<p>02.26</p>	<p>TO INFORM THE OFFER TO AFFILIATED COLLEGES FOR STARTING NEW NON-AICTE PROGRAMMES FROM SESSION 2018-19</p> <p>It is proposed to offer new Programmes in Affiliated Colleges from the Academic Session 2018-19. Complete list including new Programmes is attached (ANNEXURE-XXVI: Pages 1132-1134).</p> <p>The Item is placed before the Standing Committee of Academic Council for information please.</p>	<p>Noted.</p>									

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

<p>02.27</p>	<p>TO INFORM THE SIGNING OF SERVICE LEVEL AGREEMENT (SLA) AND REGISTRATION WITH CDSL VENTURES LIMITED (CVL) TO CHOOSE CVL NATIONAL ACADEMIC DEPOSITORY (CVL NAD) AS ITS ACADEMIC DEPOSITORY</p> <p>It is to inform that Maharaja Ranjit Singh Punjab Technical University has signed Service Level Agreement on 25.1.2018 with CDSL Ventures Limited (CVL) and registered to choose CVL NAD as National Academic Depository of the University. University will keep the academic awards in the digital format and ensure the data integrity. It is a 24x7 online mode for making available academic awards and helps in validating its authenticity, safe storage and easy retrieval. This Agreement is as per directions of UGC (ANNEX-XXVII: Page 1135).</p> <p>The Item is placed before the Standing Committee of Academic Council for information please.</p>	<p>Noted.</p>
<p>02.28</p>	<p>TO APPROVE THE MANDATORY CONDITIONS TO QUALIFY THE APPLICATION & EVALUATION PROCESS FOR FINANCIAL ASSISTANCE TO TRAVEL ABROAD AND ATTEND INTER-NATIONAL CONFERENCE (FOR GZSCCET, BATHINDA AND OTHER PITS' OF MRSPTU, BATHINDA).</p> <p>Mandatory conditions to qualify the application & evaluation process for financial assistance to travel abroad and attend International conference (for GZSCCET, Bathinda and other PITS' of MRSPTU, Bathinda) have been proposed (ANNEX-XXVIII: Pages 1136-1141).</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	<p>Approved for MRSPTU Univ Campus, GZSCCET and PITS</p>
<p>02.29</p>	<p>TO APPROVE THE STUDY SCHEMES OF NEW NON-AICTE PROGRAMMES OFFERED TO AFFILIATED COLLEGES FOR 2018 BATCH</p> <p>Some new Non-AICTE Programmes have been offered to Affiliated Colleges from 2018 Batch. It is proposed to follow Syllabi/Study Schemes of these Programmes of other Universities for 2018 Batch students or till their Syllabi/Study Schemes are not ready (ANNEXURE-XXIX: Pages 1142-1182).</p>	<p>It was decided that these schemes/syllabi be first put up before the concerned Board of Studies and then to Concerned Faculty for consideration and approval before bringing it to Academic Council</p>

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

S.N.	Study Schemes	Page No.
1	B.Sc. (Food Technology) Sem. 1 st – 6 th 2018 Batch onwards	1142-1144
2	B.Sc. (Garment Design) Sem. 1 st – 6 th 2018 Batch onwards	1145-1147
3	B.Sc. (Home Science) Sem. 1 st – 6 th 2018 Batch onwards	1148-1151
4	Bachelor of Management Studies (Rural Development) Sem. 1 st – 6 th 2018 Batch onwards	1152-1154
5	M.Sc. (Mathematics & Computing) Sem. 1 st – 4 th 2018 Batch onwards	1155-1156
6	B.Sc. (Hons.) (Agronomy) Sem. 1 st – 8 th 2018 Batch onwards	1157-1160
7	B.Com. (E-Commerce) Sem. 1 st – 2 nd 2018 Batch onwards	1161
8	B.Sc. (Animation & Multimedia Technology) Sem. 1 st – 6 th 2018 Batch onwards	1162-1164
9	B.Sc. (Computer Science) Sem. 1 st – 6 th 2018 Batch onwards	1165-1168
10	B.Sc. (Non- Medical) Sem. 1 st – 6 th 2018 Batch onwards	1169-1173
11	M.Sc. (Clinical Research) Sem. 1 st – 4 th 2018 Batch onwards	1174-1175
12	M.Sc. (Computer Science) Sem. 1 st – 4 th 2018 Batch onwards	1176-1178
13	Skill Certificate Course in Computer Hardware and Networking Sem. 1 st 2018 Batch onwards	1179
14	Skill Certificate Course in Computer Proficiency-I, Sem. 1 st 2018 Batch onwards	1180
15	Skill Certificate Course in Computer Proficiency-II, Sem. 1 st 2018 Batch onwards	1181
16	Skill Certificate Course in Medical Lab. Technology Sem. 1 st – 2 nd 2018 Batch onwards	1182

The Item is placed before the Standing Committee of Academic Council for approval please.

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

<p>02.30</p>	<p>TO APPROVE Ph.D. REGISTRATION OF BHARAT KHURANA AND ROHIT BHATIA IN FACULTY OF PHARMACY</p> <p>After successful completion of prescribed Course Work and subsequent acceptance of Research Proposals by DDRC, Ph.D. Candidates Bharat Khurana and Rohit Bhatia under the Faculty of Pharmacy have been issued the provisional registration letters (ANNEXURE-XXX: Pages 1183-1184). The Research Work titles as recommended by DDRC are:</p> <ol style="list-style-type: none"> 1.Design and Development of Novel Drug Delivery Systems of Resveratrol for Treatment of Psoriasis. 2.Design, Synthesis and Evaluation of Coumarin Fused/Tethered Nitrogen containing Heterocycles as Anticancer Agents. <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	<p>Approved.</p>
<p>02.31</p>	<p>TO APPROVE THE REMOVAL OF NEGATIVE MARKING FOR EVALUATION OF Ph.D. ADMISSION TEST</p> <p>A proposal has been received to remove negative marking for evaluation of Ph.D. Admission Test (ANNEX-XXXI: Page 1185).</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	<p>Approved.</p>
<p>02.32</p>	<p>TO APPROVE THE STARTING OF NEW NON-AICTE COURSES IN THE SAME CAMPUS BY THE EXISTING AFFILIATED TECHNICAL INSTITUTIONS AS PER NORMS OF THE UNIVERSITY/STATUTORY BODY</p> <p>Existing Technical Institutions affiliated with the University willing to start new Non-AICTE Courses may be allowed to start the Course in the same Campus provided it fulfils all the norms/regulations regarding the infrastructure/faculty and other norms of the University/Statutory Body, without sharing the essential facilities, such as, Class Rooms, Laboratories, etc. with the already approved Technical Institution. However, Common Amenities, such as, Canteen, Auditorium, Playgrounds, Parking, etc. may be shared, provided it caters to all the students of all the Programmes (ANNEXURE-XXXII: 1186-1188 Pages).</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	<p>Approved.</p>

**MINUTES OF 2ND MEETING OF STANDING COMMITTEE OF ACADEMIC COUNCIL
HELD ON 26.02.2018**

<p>02.33</p>	<p>TO DISCUSS AND APPROVE B.TECH. (AERONAUTICAL ENGG.) SYLLABUS AS RECEIVED FROM PSCAC, PATIALA FOR 2018 BATCH ONWARDS</p> <p>Punjab State Civil Aviation Council, Patiala has got prepared B.Tech. (Aeronautical Engg.) syllabus from NITTTR, Chandigarh (ANNEXURE-XXXIII: Pages 1189-1378) to be applicable from 2018 Batch. B.Tech First Year. syllabus of all branches of B.Tech. is common as per prevalent practice. B.Tech. 1st year syllabus for 2018 Batch as per guidelines of AICTE is given in ANNEXURE-VII (Pages 958-979). It is recommended that 1st year syllabus as given in ANNEXURE-VII (Pages 958-979) be applicable to B. Tech. (Aeronautical Engg.)</p> <p>The Item is placed before the Standing Committee of Academic Council for discussion and approval please.</p>	<p>Same B.Tech. 1st year syllabus will be followed for all the B.Tech. programmes including B.Tech. (Aeronautical Engg.) programme proposed by Punjab State Council for Civil Aviation, Patiala.</p>
<p>02.34</p>	<p>TO AUTHORISE VICE CHANCELLOR TO TAKE DECISIONS IN CASE OF ANY URGENT ACADEMIC MATTERS</p> <p>It is proposed to authorize the Vice Chancellor to take decisions in case of urgent academic matters, to be ratified later on by BoG.</p> <p>The Item is placed before the Standing Committee of Academic Council for approval please.</p>	<p>Approved.</p>
<p>TABLE AGENDA</p>		
<p>02.35</p>	<p>MRSPTU Ph.D. ADMISSION RELATED MATTERS</p> <p>In addition, it was deliberated and decided that,</p> <ol style="list-style-type: none"> 1. Heads of Departments may get 3 sets of Question Papers prepared in their discipline from the experts of elite institutions/Universities, including IITs, NITs and shall hand over these Question Papers to office of Dean (R&D). One from the available shall be used as a Ph.D. Entrance Test of the MRSPTU. 2. It was also decided that Ph.D. admissions shall be held twice in a year at the start of each academic session, however Ph.D. Admission entrance test shall be conducted only once per year. 3. Furthermore, it was decided that for admission to Ph.D. in Computer Sc & Engg., the existing Ph.D. eligibility qualifications shall also include BE/B.Tech. in any stream of Engg & Tech. <p>The Item is placed before the Standing Committee of Academic Council for consideration and approval please.</p>	<p>Discussed and approved</p>

The Meeting concluded with a vote of thanks to the Chair.

**DEAN ACADEMIC AFFAIRS,
MRSPTU, BATHINDA**

4 th SEMESTER		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BAGE1-435	Introduction to Genetics	2	1	0	40	60	100	3
BAGE1-436	Principles of Seed Technology	2	0	0	40	60	100	2
BAGE1-437	Principles of Agronomy-II (Rabi Crops)	2	1	0	40	60	100	3
BAGE1-438	Organic Farming	1	0	0	40	60	100	1
BAGE1-439	Insect Ecology and Pest Management	2	0	0	40	60	100	2
BAGE1-440	Farm Management & Agriculture Finance	2	0	0	40	60	100	2
BAGE1-441	Extension Methodology and Communication Skills	1	1	0	40	60	100	2
BAGE1-442	Livestock Production and Management	2	0	0	40	60	100	2
BAGE1-443	Introduction to Genetics Lab.	0	0	2	60	40	100	1
BAGE1-444	Principles of Seed Technology Lab.	0	0	2	60	40	100	1
BAGE1-445	Principles of Agronomy-II (Lab/Field).	0	0	2	60	40	100	1
BAGE1-446	Organic Farming (Lab./Field)	0	0	2	60	40	100	1
BAGE1-447	Insect Ecology and Pest Management (Lab./Field)	0	0	2	60	40	100	1
BAGE1-448	Farm Management & Agriculture Finance Lab.	0	0	2	60	40	100	1
BAGE1-449	Livestock Production and Management Lab.	0	0	2	60	40	100	1
Total		14	3	14	740	760	1500	24

5 th SEMESTER		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BAGE1-550	Introduction to Plant Breeding	2	0	0	40	60	100	2
BAGE1-551	Plant Tissue Culture and Genetic Transformation	2	0	0	40	60	100	2
BAGE1-552	Chemistry of Agrochemicals	2	0	0	40	60	100	2
BAGE1-553	Introductory Forestry	1	0	0	40	60	100	1
BAGE1-554	Flower Cultivation and Landscape Gardening	1	1	0	40	60	100	2
BAGE1-555	Diseases of Horticultural Crops and their Management	1	1	0	40	60	100	2
BAGE1-556	Insect Pests of Crops and Stored Grains	2	0	0	40	60	100	2
BAGE1-557	Crop Residue Management	1	0	0	40	60	100	1
BAGE1-558	Agriculture Marketing Trade and Prices	2	0	0	40	60	100	2
BAGE1-559	Introduction to Plant Breeding Lab.	0	0	2	60	40	100	1
BAGE1-560	Plant Tissue Culture and Genetic Transformation Lab.	0	0	2	60	40	100	1
BAGE1-561	Introductory Forestry (Practical)	0	0	2	60	40	100	1
BAGE1-562	Flower Cultivation and Landscape Gardening Lab.	0	0	2	60	40	100	1
BAGE1-563	Diseases of Horticultural Crops and their Management Lab.	0	0	2	60	40	100	1
BAGE1-564	Insect Pests of Crops and Stored Grains Lab.	0	0	2	60	40	100	1
BAGE1-565	Practical Crop Production (<i>Kharif Crops</i>) Lab.	0	0	2	0	100	100	1
Educational Tour								---
Total		14	2	14	720	880	1600	23

INTRODUCTION TO GENETICS

Subject Code: BAGE1-435

**L T P C
2 1 0 3**

Duration: 37 Hrs.

Unit-1

Structure of cell and cell organelles and their functions: mitosis and meiosis, significance and differences between them; Study of chromosome structure, morphology, number and types; Karyotype and idiogram; Mechanism of crossing over and cytological proof of crossing over; Numerical and structural chromosomal aberrations.

Unit-II

Mendel's laws of inheritance and exceptions to the laws, Cytoplasmic inheritance, its characteristic features and difference between chromosomal and cytoplasmic inheritance; Types of gene action, Multiple alleles, Pleiotropism, Penetrance and expressivity; Qualitative and Quantitative traits and differences between them; Multiple factor hypothesis.

Unit-III

DNA and its structure, function, types, modes of replication and repair, RNA and its structure, function and types; Transcription and Translation; Genetic code and outline of protein synthesis; Linkage, types of linkage and its estimation; Mutation and its characteristic features; Methods of inducing mutations and detection of sex linked and autosomal mutations (CLB technique etc.).

Unit-IV

Evolution of different crop species like cotton, wheat, gram, triticales and Brassicas.

Recommended Books:

1. B.D. Singh, 'Fundamentals of Genetics'.
2. P.K. Gupta, 'Genetics'.
3. E.J. Gardner and M.J. Simmons, 'Principles of Genetics'.

PRINCIPLES OF SEED TECHNOLOGY

Subject Code: BAGE1-436

**L T P C
2 0 0 2**

Duration: 25 Hrs.

Unit-I

Introduction to seed production; seed policy; deterioration of crop varieties; maintenance of genetic purity during seed production; seed quality

Unit-II

Different classes of seed; Nucleus, Breeder, Foundation and certified seed production of varieties and hybrids of field and vegetable crops

Unit-III

Seed certification, phases of certification, procedure for seed certification, field inspection and field counts etc.; constitution and role of central seed committee, central seed certification board, state seed certification agency, central and state seed testing laboratories; duties and powers of seed inspectors, offences and penalties; seed control order; Seed Act; other issues related to WTO, IPRs, Patenting, Plant Breeder's Rights; varietal identification through grow-out test and electrophoresis; seed drying; establishment of seed processing plant; establishing a seed testing laboratory

Unit-IV

Seed testing procedures for quality assessment, seed treatment, importance of seed treatment, types of seed treatment, seed packing and seed storage, stages of seed storage, factors affecting seed longevity during storage and conditions required for good storage, general

principles of seed storage, measures for pest and disease control, temperature control, seed marketing, factors affecting seed marketing.

Recommended Books:

1. R.L Agrawal, 'Seed Technology'.
2. P.K. Agarwal, 'Principles of Seed Technology'.
3. Khare and Bhale, 'Seed Technology'.

PRINCIPLES OF AGRONOMY-II (RABI CROPS)

Subject Code: BAGE1-437

L T P C
2 1 0 3

Duration: 37 Hrs.

Unit-I

Origin, geographic distribution, area, yield and production of *rabi* crops in different states of India; Causes of variation in their productivity under different agro-ecologies of the country; National and International Agricultural Research Institutes and their mandate and role in Indian agriculture.

Unit-II

Economic importance, soil and climatic requirements, varieties, cultural practices and production techniques of rabi season cereal crops

Unit-III

Economic importance, soil and climatic requirements, varieties, cultural practices and production techniques of rabi pulses -chickpea, lentil, field pea, French bean and oilseeds rapeseed and mustard, sunflower, safflower, linseed

Unit-IV

Economic importance, soil and climatic requirements, varieties, cultural practices and production techniques of other important rabi crops such as sugarcane, sugar beet, potato, tobacco and forage crops- berseem, Lucerne and oats

Recommended Books:

1. Chidra Singh, 'Modern Techniques of Raising Field Crops'.
2. 'Package of Practices for Rabi Crops', PAU.
3. S.R. Reddy, 'Agronomy of Field Crops'.
4. 'Hand Book of Agriculture', Indian Council of Agricultural Research.
5. Rajendra Prasad, 'Text Book of Field Crop'.

ORGANIC FARMING

Subject Code: BAGE1-438

L T P C
1 0 0 1

Duration: 12 Hrs.

Unit-I

Organic Farming: introduction, concept, relevance in the present context; Merits and demerits. Organic production requirements; Biological intensive nutrient management, Bio-farming.

Unit-II

Recycling and *in situ* management of organic residues; site selection, Soil improvement and amendments; integrated diseases and pest management

Unit-III

Use of bio-control agents; bio-pesticides; pheromones, trap crops and bird perches, biological weed management.

Unit-IV

Quality considerations- certification, labelling and accreditation processors, marketing and export requirements for organic products.

Recommended Books:

1. Anil Chavan and Sandeep Raskar, 'Text Book of Organic Agriculture'.
2. D. Kumara Manimuthu Veeral, 'Text Book of Organic Farming'.

INSECT ECOLOGY AND PEST MANAGEMENT

Subject Code: BAGE1-439

L T P C
2 0 0 2

Duration: 25 Hrs.

Unit-I

Insect Ecology: Introduction, environment and its components, effect of abiotic and biotic factors. Biotic potential, environmental resistance and causes of pest outbreaks in agro-ecosystem. Pest and its categories, Crop Losses. Beneficial insects: important pollinators, weed killers and scavengers; their importance. Important non-insect pests: mites, rodents and birds.

Unit-II

Chemical Control: importance, hazards and limitations. Natural Control. Host plant resistance. Physical, Mechanical and Cultural Control. Biological Control: parasitoids, predators and microbes. Legislative Control. Insecticide Act 1968.

Unit-III

Classification, toxicity and formulations of insecticides. Study of important insecticides: botanicals, organochlorines, organophosphates, carbamates, synthetic pyrethroids. Rodenticides, Acaricides and Fumigants. Biorational and other innovative approaches in pest management: insect growth regulators (Hormones), semiochemicals, Synergism, Pheromones, Repellents, antifeedants, chemosterilants, genetic control etc.

Unit-IV

Pest surveillance, monitoring and forecasting. Economic threshold and Economic injury levels. Integrated pest management (IPM): need; its tools and limitations. IPM in important vegetables: brinjal, okra, cauliflower and cucurbits.

Recommended Books:

1. A.S. Atwal and G.S. Dhaliwal, 'Agricultural Pests of South Asia and their Management', Kalyani Publishers, Ludhiana.
2. G.S. Dhaliwal and Ramesh Arora, 'Principles of Insect Pest Management', National Agricultural Technology Information Centre, Ludhiana.
3. R.C. Saxena and R.C. Srivastava, 'Entomology at a Glance', Agrotech Publishing Academy, Udaipur.
4. S.S. Bains and A.S. Atwal, 'Applied Animal Ecology', Kalyani Publishers, Ludhiana.
5. G.S. Dhaliwal, Ram Singh and B.S. Chillar, 'Essentials of Agriculture Entomology', Kalyani Publishers, Ludhiana.
6. G.S. Dhaliwal and K.P. Srivastava, 'A Text Book of Applied Entomology', Vol.-I and II, Kalyani Publishers, Ludhiana.

FARM MANAGEMENT AND AGRICULTURAL FINANCE

Subject Code: BAGE1-440

**L T P C
2 0 0 2**

Duration: 25 Hrs.

Unit-I

Farm Management: meaning, definition and Importance; Economic principles applicable to the organizations of farm business. Agricultural Production Economics: definition, nature and scope; Laws of returns; Factor- product Relationships; determination of optimum input and output.

Unit-II

Types and Systems of Farming: Farm planning and budgeting; Risk and uncertainty; Farm record keeping- need and importance.

Unit-III

Agricultural Finance: nature and scope, compounding and discounting. Agricultural credit: meaning, definition, need and classification; Credit appraisal; History of financing agriculture in India. Agricultural Financial Institutions, indebtedness problems.

Unit-IV

Assessment of Crop Losses: Determination of compensation; Crop insurance; Agricultural Cooperatives- philosophy and principles; History of Indian Cooperative Movement; Reorganization of cooperative credit structure.

Recommended Books:

1. Joginder Singh, 'Farm Business Accounting', R.S.G. Publishers.
2. Singh and Lekhi, 'Agricultural Economics', Kalyani Publishers.
3. Johl and Kapoor, 'Fundamental of Farm Management', Kalyani Publishers.

EXTENSION METHODOLOGIES AND COMMUNICATION SKILLS

Subject Code: BAGE1-441

**L T P C
1 1 0 2**

Duration: 25 Hrs.

Unit-I

Meaning, nature, importance, models and barriers in communication; Extension programme planning; Principles and steps in programme development process; Monitoring and evaluation of extension programmes

Unit-II

Extension teaching methods and factors influencing their selection and use; Combination (Media Mix) of teaching methods; Innovative information sources; Audio- visual aids; Meaning, scope and importance of agricultural journalism.

Unit-III

Diffusion and adoption of innovations; Models of adoption process. Factors influencing adoption process.

Unit-IV

Capacity building of extension personnel and farmers, Communication skills for effective transfer of technology; Organizing Field days, exhibitions; seminars and conferences

Recommended Books:

1. G.L Ray, 'Extension Communication and Management'.
2. O.P. Dharma and O.P. Bhatnagar, 'Education and Communication for Development'.
3. Ranjit Singh, 'Extension Education'.

LIVESTOCK PRODUCTION AND MANAGEMENT

Subject Code: BAGE1-442

**L T P C
2 0 0 2**

Duration: 27 Hrs.

Unit-I

Place of livestock in the national economy, Livestock development programmes. Exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Reproductive behaviour; oestrous cycle. Artificial Insemination. Pregnancy and parturition in various livestock species. Care of pregnant animal and new born young one. Measures and factors affecting fertility in livestock.

Unit-II

Physiology of milk secretion and different milking methods. Factors affecting milk yield and composition. Selection procedure and various systems of breeding in livestock.

Unit-III

Feeding and management of calves, heifers, pregnant and milch animals sheep, goat and swine. Housing principles for livestock. Vaccination and prevention of important diseases of livestock and poultry.

Unit-IV

Important breeds of poultry, egg formation, abnormal eggs and factors affecting egg size. Moulting, incubation, hatching and brooding. Housing, breeding, feeding and management of poultry. Biotechnological interventions in animal production and reproduction.

Recommended Books:

1. G.C. Banerjee, 'A Textbook of Animal Husbandry', Oxford IBH Publications.
2. C.K. Thomas and N.S.R. Shastr, 'Dairy Bovine Production', Kalyani Publications.
3. C.K. Thomas and N.S.R. Shastry, 'Livestock Production Management', Kalyani Publications.
4. 'Handbook of Animal Husbandry', ICAR Publication.
5. R.A. Singh 'Poultry Production Management', Kalyani Publications.

INTRODUCTION TO GENETICS LAB.

Subject Code: BAGE1-443

**L T P C
0 0 2 1**

Microscopy (Light microscopes and electron microscopes; Preparation and use of fixatives and stains for light microscopy; Preparation of micro slides and identification of mitosis and meiosis; Monohybrid, Dihybrid and Trihybrid ratios and their modifications; Chi- square analysis; Interaction of factors; Epistatic factors, Supplementary factors and Duplicate factors; Complementary factors, Additive factors and Inhibitory factors; Linkage - Two point test cross; Linkage - Three point test cross; Induction of polyploidy using colchicine; Induction of chromosomal aberrations using chemicals.

PRINCIPLES OF SEED TECHNOLOGY LAB.

Subject Code: BAGE1-444

**L T P C
0 0 2 1**

Seed sampling principles and procedures; physical purity analysis of field crops; germination analysis of field crops; moisture tests of field crops; viability test of field crops; seed health test of field crops; seed dormancy and breaking methods; grow out tests for varietal identification; visit to seed production plots; visit to seed processing plants; visit to seed testing laboratories; planting ratios, isolation distance and rouging, etc.

PRINCIPLES OF AGRONOMY-II LAB./FIELD

Subject Code: BAGE1-445 **L T P C**
0 0 2 1

Study of manures, fertilizers and green manure crops; Study of inter-cultural implements; Methods of fertilizer application; Seed bed preparation and sowing of wheat, sugarcane and sunflower; Calculations of seed rate; Identification of weeds in wheat and grain legumes; Morphological characteristics of wheat, sugarcane, chickpea and mustard; Yield components of wheat and sugarcane.

ORGANIC FARMING LAB./FIELD

Subject Code: BAGE1-446 **L T P C**
0 0 2 1

Raising of vegetable crops through organic sources. Diseases and pest management; Vermicomposting; Vegetable and ornamental nursery raising; Macro quality analysis; Grading, packaging and post-harvest management.

INSECT ECOLOGY AND PEST MANAGEMENT LAB./FIELD

Subject Code: BAGE1-447 **L T P C**
0 0 2 1

Study of terrestrial and pond ecosystem, behaviour, orientation, distribution patterns of insects. Sampling techniques for the estimation of insect population and damage. Pest surveillance through light and pheromone traps. Practicable IPM practices. Insecticides and their formulations; calculation of doses of insecticides. Compatibility of pesticides. Identification of common insect-pests, phytophagous mites, rodent, bird pests and their damage, other beneficial insect-pollinators, weed killers and scavengers.

FARM MANAGEMENT AND AGRICULTURAL FINANCE LAB.

Subject Code: BAGE1-448 **L T P C**
0 0 2 1

Filling of farm record book, analysis of farm records and possible improvements, Methods of depreciation. Preparation of farm plans and budgets, profit and loss account. Break-even analysis. Economic analysis of different crop and livestock enterprises. Compounding and discounting the cost and return. Preparation of balance sheet, income statement and cash flow analysis. Estimation of credit needs. Determination of unit costs. Preparations and analysis of loan proposals.

LIVESTOCK PRODUCTION AND MANAGEMENT LAB./FARM

Subject Code: BAGE1-449 **L T P C**
0 0 2 1

Visit to livestock farms and breed identification. Study of external body parts. Handling and restraining of animals. Judging of animals. Milking methods. Feeding and ration formulation. Record keeping. Study of reproductive organs and Artificial Insemination. Physiological norms in cattle and buffaloes. Hatching, housing and management of poultry.

INTRODUCTION TO PLANT BREEDING

Subject Code: BAGE1-550

**L T P C
2 0 0 2**

Duration: 25 Hrs.

Unit-I

Floral biology, emasculation and pollination techniques in cereals (wheat, rice and maize), millets (bajra and sorghum), pulses (chickpea, pigeon pea and moong bean), oilseeds (Brassica and sunflower), cash crops (cotton and sugarcane). Modes of reproduction- sexual and asexual.

Unit-II

Plant Breeding- aims and objectives. Modes of pollination, its genetic consequences and significance in plant breeding. Methods of breeding in self- and cross-pollinated crops. Introduction and Domestication; Johannsen's pure-line theory and its genetic basis; mass selection and pure line selection. Hybridization- aims and objectives, types of hybridization. Methods of handling segregating generations- pedigree method, bulk method, back cross method.

Unit-III

Self-incompatibility and male sterility and their utilization in crop improvement. Heterosis, inbreeding depression, various theories of heterosis, exploitation of hybrid vigour, development of inbred lines, single-cross and double cross hybrids; population improvement methods, progeny selection, mass selection, recurrent selection; synthetics and composites; multiline varieties.

Unit-IV

Mutation breeding; ploidy breeding; Apomixis- its types and significance; wide hybridization and its role in crop improvement.

Recommended Books:

1. G.S. Chahal and S.S. Gosal, 'Principles and Procedure of Plant Breeding', Narosa Publishing House.
2. B.D. Singh, 'Plant Breeding: Principles and Methods', Kalyani Publishers.
3. V.L. Chopra, 'Plant Breeding: Theory and Practice', Oxford & IBH Publishing Co. Pvt. Ltd.
4. V.L. Chopra, 'Breeding Field Crops: Theory and Practice', Oxford & IBH Publishing Co. Pvt. Ltd.
5. Hari Har Ram, 'Crop Breeding and Biotechnology', Kalyani Publishers.

PLANT TISSUE CULTURE AND GENETIC TRANSFORMATION

Subject Code: BAGE1-551

**L T P C
2 0 0 2**

Duration: 25 Hrs.

Unit-I

Tissue culture- concepts and history; various aspects of plant tissue culture; somatic cell cultures. somatic embryogenesis; meristem culture; *In vitro* grafting; micropropagation; somaclonal variations.

Unit-II

Anther and pollen culture; embryo/ovule/ovary culture. Production of secondary metabolites through tissue culture.

Unit-III

Protoplast culture and somatic hybridization; cryopreservation of germplasm.

Unit-IV

Methods of genetic transformation; testing and commercialization of transgenic crops.

Recommended Books:

1. H.S. Chawla, 'Introduction to Plant Biotechnology', Science Publishers.
2. T.A. Brown, 'Gene Cloning and DNA Analysis', Wiley-Blackwell.
3. Jayabalan, 'Plant Biotechnology'.
4. U. Kumar, 'Methods in Plant Tissue Culture'.
5. M.K. Razdan, 'Introduction to Plant Tissue Culture'.

CHEMISTRY OF AGROCHEMICALS

Subject Code: BAGE1-552

L T P C
2 0 0 2

Duration: 25 Hrs.

Unit-I

Organic chemistry as prelude to agrochemicals. Diverse types of agrochemicals.

Unit-II

Synthetic organic insecticides, major classes, chemistry and use of Carbamates (Carbaryl, carbofuran, thiodicarb, Triazamate), Organophosphates (Acephate, Chloropyrifos methyl, Quinalphos, Dimethoate), phenylpyrazoles (Fipronil, Ethiprole), Neonicotinoids (Imidacloprid, Acetamiprid), Metaflumizone, Indoxacarb, fenoxycarb.

Unit-III

Herbicides-major classes, chemistry and use of Phenoxy, Triazine, Triazinone, Benzothiadiazole, Amide, Organophosphorus, Pyrazolone, bipridylum, and Thiocarbamate. Fungicides - major classes, Chemistry and use of carbendazim, carboxin, captan, tridemorph, copper oxychloride Mancozeb, Tricyclazole, Carbendazim, Hexaconazole, Metalaxyl.

Unit-IV

Botanical insecticides (neem), pyrethrum and synthetic pyrethroids. Plant growth regulators.

Recommended Books:

1. A.S. Atwal and G.S. Dhaliwal 'Agricultural Pests of South Asia and their Management'.
2. V.S. Walia, 'Weed Management'.
3. O.P. Gupta, 'Modern Weed Management'.
4. R.P. Singh, 'Plant Pathology'.
5. T.V. Sathe, 'Agro-chemicals and Pest Management'.
6. N.K. Roy, 'Chemistry of Pesticides'.
7. D.S. Reddy, 'Pesticides'.
8. T.K. Das, 'Weed Science Basic and Application'.

INTRODUCTORY FORESTRY

Subject Code: BAGE1-553

L T P C
1 0 0 1

Duration: 14 Hrs.

Unit-I

Forestry: definition, scope and important terminology. Status and role of forests in India. History of forestry development in India. National and international forestry organizations. Forest types, distribution of forests and their classification.

Unit-II

Silviculture & its objectives; tending operations. Locality factors: climatic, edaphic, topographical and biotic. Agroforestry, farm forestry and social forestry - definition, objectives and need. Role of trees in rural economy.

Unit-III

Choice of species w.r.t. site/economic uses and constraints of tree growing. Tree propagation and planting methods.

Unit-IV

Deforestation: Forms, causes and remedial measures. Forest management: growing stock, normal forest, sustained yield, increment and rotation. Forest utilization, major and minor forest products. Forest policies and legislations.

Recommended Books:

1. K.M. & S. Prabhu, 'Indian Forestry', IFS.
2. A.J. Raj & S. B Lal, 'Forestry: Principles & Applications'.
3. A.P. Dwivedi, 'Text Book of Silviculture'.
4. Manikandan, 'Indian Forestry'.

FLOWER CULTIVATION AND LANDSCAPE GARDENING

Subject Code: BAGE1-554

L T P C
1 1 0 2

Duration: 27 Hrs.

Unit-I

Introduction to floriculture and landscaping. Package of practices for rose, chrysanthemum, gladiolus, marigold and tuberose.

Unit-II

Planning of gardens. Landscape-art principles, formal, informal, free and wild styles of gardens. Nursery production of ornamentals.

Unit-III

Maintenance and uses of trees, shrubs, climbers, cactus and succulents and shade loving plants.

Unit-IV

Annual flowering plants and their uses. Making and maintenance of lawns.

Recommended Books:

1. J.S. Arora, 'Introductory Ornamental Horticulture'.
2. Swarup, 'Garden Flowers'.
3. 'Package of Practices of Flower Crop', PAU Ludhiana.
4. Desh Raj, 'Floriculture at a Glance'.
5. ICAR, 'Handbook of Horticulture'.
6. M.S. Randhawa, 'Floriculture in India'.

DISEASES OF HORTICULTURAL CROPS AND THEIR MANAGEMENT

Subject Code: BAGE1-555

L T P C
1 1 0 2

Duration: 27 Hrs.

Unit-I

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of citrus, mango, banana, grapevine, pomegranate and papaya.

Unit-II

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of guava, sapota, ber, pear, peach, plum and apple.

Unit-III

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of chilli, brinjal, okra, potato, crucifers, cucurbits, tomato, pea, beans, onion and garlic.

Unit-IV

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of rose, chrysanthemum, gladiolus, marigold and jasmine.

Recommended Books:

1. G.P. Jagtap, 'Diseases of Horticulture Crops & their Management'.
2. P. Parvatha Reddy, 'Fungal Diseases & their Management in Horticulture Crops'.
3. 'Field Problems of Crops', PAU Ludhiana.
4. D.P. Tripathi, 'Introductory Plant Pathology'.
5. 'Handbook of Horticulture', ICAR.

INSECT PESTS OF CROPS AND STORED GRAINS

Subject Code: BAGE1-556

L T P C
2 0 0 2

Duration: 27 Hrs.

Unit-I

Distribution, biology, symptoms of damage and management strategies of insect pests of rice, sorghum, maize, cotton, groundnut, sugarcane, ragi (*Eleusine coracana*), wheat, sunhemp, pulses, castor, safflower, sunflower and mustard.

Unit-II

Distribution, biology, symptoms of damage and management strategies of insect pests of brinjal, bhindi, tomato, cruciferous and cucurbitaceous vegetables, potato, sweet potato, chillies, turmeric, onion, coriander, garlic and ginger.

Unit-III

Distribution, biology, symptoms of damage and management strategies of insect pests of mango, citrus, grapevine, cashew, banana, pomegranate, guava, sapota, ber, apple and coconut.

Unit-IV

Distribution, biology, symptoms of damage and management strategies of insect pests of tobacco, coffee, tea, ornamental plants and stored grain insect pests.

Recommended Books:

1. A.S. Atwal and G.S. Dhaliwal, 'Agricultural Pests of South Asia and their Management'.
2. K.P. Srivastva and G.S. Dhaliwal, 'A Text Book of Applied Entomology'.
3. Vikaspedia, 'Stored Grain Pests and their Control'.
4. 'Integrated Pest Management', FAO of United Nation.

CROP RESIDUE MANAGEMENT

Subject Code: BAGE1-557

L T P C
1 0 0 1

Duration: 14 Hrs.

Unit-I

Significance of crop residue management in Indian agriculture. Challenges for diversified uses of crop residue in high cropping intensity areas.

Unit-II

Crop residue management in relation to agricultural ecosystems and conservation agriculture. On-site and off-site management of crop residues and soil health indicators.

Unit-III

Effects of crop residue management on soil health, crop yields, social and environmental concerns.

Unit-IV

Recent technologies for residue management in conservation agriculture based systems.
Policy options for efficient residue management in Punjab.

Recommended Books:

1. Rajendra Prasad, 'Text Book of Plant Nutrient Management', Indian Society of Agronomy.
2. M.L. Dotaniya, 'Crop Residue Management in Rice-Wheat Cropping System', Lambard Academic Publishing.
3. Verlon K. Vrana, 'Crop Residue Management for Conservation'.
4. J.L. Hatfield & A. Stewart, 'Crop Residue Management'.
5. Paul W. Unger, 'Managing Agricultural Residues'.
6. S.K. Sharma, 'Crop Residue Management: for Soil Health, Crop Productivity, & Environmental Quality'.
7. Rashad Hegazy, 'Residue Management Devices for No- till Drills'.
8. LPea Kai, 'Agricultural Residue Management in Developing Countries'.

AGRICULTURAL MARKETING, TRADE AND PRICES

Subject Code: BAGE1-558

L T P C
2 0 0 2

Duration: 27 Hrs.

Unit-I

Agricultural Marketing: Concept, definition, scope, components of market, classification of markets, Market structure, conduct and performance; Market functionaries. Producer's surplus: meaning, types, marketable surplus and marketed surplus. Marketing efficiency: meaning, marketing costs, margins and price spreads.

Unit-II

Trade: domestic trade, free trade, international trade, GATT, WTO, implications of AOA, market access, domestic support, export subsidies, WTO ministerial conferences, EXIM policy of India.

Unit-III

Market Integration: definition, types; co-operative marketing; state trading. Ware Housing Corporation: objectives, functions and advantages. Food Corporation of India: objectives and functions.

Unit-IV

Quality Control: agricultural products, AGMARK, meaning and need for agricultural marketing policy. Risk in marketing: meaning, importance and types of risks; speculations and hedging. Futures trading, contract farming, e-marketing.

Recommended Books

1. S.S. Acharya, 'Agricultural Marketing in India'.
2. Joginder Singh & R.K. Lekhi, 'Agricultural Marketing, Trade and Prices: An Indian Perspective', Kalyani Publishers, 2018.
3. C.B. Mamoria & R.L. Joshi, 'Principles and Practices of Marketing in India'.
4. F.L. Thomson, 'Agricultural Marketing'.

INTRODUCTION TO PLANT BREEDING LAB.

Subject Code: BAGE1-559

L T P C
0 0 2 1

Botanical description and floral biology; study of megasporogenesis and microsporogenesis. Fertilization and life cycle of an angiospermic plant. Plant Breeder's kit: hybridization

techniques and precautions to be taken while attempting crosses; floral morphology, selfing, emasculation and crossing techniques in different self and cross pollinated species. Study of male sterility and incompatibility.

PLANT TISSUE CULTURE AND GENETIC TRANSFORMATION LAB.

Subject Code: BAGE1-560 **L T P C**
0 0 2 1

Medium preparation. Surface sterilization of explants. Establishment of callus/cell suspension cultures. Induction of plant regeneration. Hardening and transfer to soil. Micropropagation. Embryo culture. Anther and pollen culture. Particle gun bombardment.

FLOWER CULTIVATION AND LANDSCAPE GARDENING LAB.

Subject Code: BAGE1-561 **L T P C**
0 0 2 1

Identification of trees, shrubs, climbers, houseplants, seasonal flowers; layout of lawns and maintenance. Potting, repotting and maintenance of houseplants. Training and pruning of rose. Pinching and disbudding chrysanthemum. Planning of gardens and development of garden features. Post-harvest handling of cut flowers.

DISEASES OF HORTICULTURAL CROPS AND THEIR MANAGEMENT LAB.

Subject Code: BAGE1-562 **L T P C**
0 0 2 1

Study of symptoms and host-parasite relationships of important diseases of horticultural crops; Field visits at appropriate time during the semester.

INTRODUCTORY FORESTRY LAB.

Subject Code: BAGE1-563 **L T P C**
0 0 2 1

Identification of trees. Measurement of tree height, diameter, girth, bark thickness, increment, age and volume. Nursery raising and silvicultural practices of some economic forest trees viz., safeda, poplar, shisham, mulberry, kikar, sagwan, dek, bamboo and subabul.

INSECT PESTS OF CROPS AND STORED GRAINS LAB.

Subject Code: BAGE1-564 **L T P C**
0 0 2 1

Identification of insect pests and their damage symptoms of rice, sorghum, maize, wheat, sugarcane, cotton, pulses, oil seeds crops and store grains; important vegetables and fruits crops in the Punjab.

PRACTICAL CROPS PRODUCTION (KHARIF CROPS) LAB.

Subject Code: BAGE1-565 **L T P C**
0 0 2 1

Crop planning, raising field crops in multiple cropping systems using improved agronomic practices. Field preparation, seed treatment, sowing, fertigation, water management and weed

management. Disease and insect pest management in the crop. Harvesting, threshing, drying, winnowing, storage and marketing of the produce. Preparation of balance sheet including cost of cultivation. [These operations shall be conducted by students themselves under the supervision of teacher(s)].

MRSPTU

**MRSPTU B.Sc. MEDICAL LABORATORY SCIENCE (SEM 5-6) SYLLABUS 2016
BATCH ONWARDS**

Total Contact Hrs. = 28

Total Marks = 1000

Total Credits= 23

Semester 5 th		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BMLS1-534	Parasitology & Virology	4	0	0	40	60	100	4
BMLS1-535	Clinical Biochemistry-II	4	0	0	40	60	100	4
BMLS1-536	Blood Banking	4	0	0	40	60	100	4
BMLS1-537	Medical Lab. Management	3	0	0	40	60	100	3
BHUM0-103	Human Values & Professional Ethics	3	0	0	40	60	100	3
BMLS1-538	Parasitology & Virology Lab.	0	0	2	60	40	100	1
BMLS1-539	Clinical Biochemistry-II Lab.	0	0	2	60	40	100	1
BHUM0-540	Blood Banking Lab.	0	0	2	60	40	100	1
BMLS1-541	Medical Lab. Management Practical	0	0	2	60	40	100	1
BMLS1-542	Seminar	0	0	2	0	100	100	1
Total		18	0	10	440	560	1000	23

Semester 6 th		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BMLS1-643	Professional Training (3 Months)	0	0	6	40	60*	100	7
BMLS1-644	Project/Practical File	0	0	0	0	100	100	5
BMLS1-645	Practical Performance/Viva	0	0	6	0	100	100	5
Total		0	0	12	40	260	300	17

- Marks to be provided by the Health Care Industry where training is provided.

PARASITOLOGY & VIROLOGY

Subject Code: BMLS1-534

**L T P C
4 0 0 4**

Duration: 45 Hrs.

Learning Objectives

1. The students will learn the morphology, life cycles & laboratory diagnosis of medically important parasites and viruses.

UNIT- 1

Introduction to Medical Parasitology (9 Hrs.)

Definition- Parasitism, host, vectors; Study of the types of animal association's parasitism commensalisms and symbiosis; Types of parasites; Classification of protozoan & Helminthes; Collection, transport, processing and preservation of samples for routine parasitological investigations.

UNIT- 2

Morphology, Life cycle and Lab Diagnosis of Protozoa, Nematodes and Platyhelminths (14 Hrs.)

Intestinal Amoebae- *Entamoeba histolytica*, *Entamoeba coli*; Flagellates of intestine/genitalia- *Giardia lamblia*; *Trichomonas vaginalis*; Malarial Parasite- *Plasmodium vivax*; Intestinal Nematodes- *Ascaris*, *Ancylostoma duodenale*; *Taenia solium*.

UNIT- 3

Introduction to virology (10 Hrs.)

Properties of viruses: structure, replication, growth; Classification of viruses; Cultivation approaches; Collection, transportation and storage of sample for viral diagnosis.

UNIT- 4

Viruses' Life cycle, Diseases and Lab diagnosis (12 Hrs.)

Polio, Rhino; Influenza; Para influenza; Mumps, Measles; Rubella; Respiratory syncytial, Rota; Chicken pox, Herpes; HIV; Viruses prevalent in India (Dengue, Japanese Encephalitis).

Course Outcomes

Through this course student should be able

1. To understand the nature of different parasites.
2. Explain the complete life cycles of intestinal and genital parasites.
3. Complete nature of the viruses.
4. Different types of viral diseases.

Recommended Books

1. K.D. Chatterjee, 'Text Book of Parasitology', Chatterjee Medical Publishers, Calcutta.
2. S.C. Parija, 'Text Book of Medical Parasitology'.
3. John B. Carter, Venetia A. Saunders, 'Virology Principles and Applications', John Wiley & Sons, Ltd., 2007.

CLINICAL BIOCHEMISTRY- II

Subject Code: BMLS1-535

L T P C
4 0 0 4

Duration: 45 Hrs.

Course Objectives

1. The students will learn about various biochemical aspects of different diseases and diagnosis/prognosis of these diseases.
2. This course will provide information about various clinically important enzymes & automation techniques.

UNIT- 1

Disorders of Metabolism (12 Hrs.)

Disorders of Carbohydrate Metabolism: Diabetes mellitus, sugar levels in blood, renal threshold for glucose, factors influencing blood glucose level, galactose tolerance tests; Analysis of T₃, T₄ and TSH, and their significance in diagnosis of metabolic disorders; Disorders of Lipid metabolism: Plasma lipoproteins, cholesterol, triglycerides & phospholipids in health and disease, hyperlipidemia, hyperlipoproteinemias, and ketone bodies; Digestive diseases- Gastric analysis and its importance.

UNIT- 2

Inborn Errors of Metabolism (10 Hrs.)

Phenylketonuria, alkaptonuria, albinism, tyrosinosis, maple syrup urine disease, Lesch-Nyhan syndrome, sickle cell anemia, Histidinemia.

UNIT- 3

Disorders of liver and kidney (14 Hrs.)

Normal and abnormal functions of liver and kidney. Jaundice, fatty liver, acute and chronic renal failure; Clearance tests for renal function. Diagnostic Enzymes clinical significance of Acid phosphatase, Alkaline phosphatase, Lactate dehydrogenase, Aspartate transaminase, Alanine transaminase and Creatine phosphokinase. Qualitative and quantitative analysis of renal calculi and its significance.

UNIT- 4

Clinical Automation (9 Hrs.)

History of Automaton, purpose; types of machines used in the routine laboratory practices their principles, construction and working.

Course Outcomes

Through this course student should be able

1. To know the metabolic disorders due the deficiencies of various bio- molecules.
2. Concepts of Inborn metabolic problems.
3. Various liver and kidney complications.
4. To understand the clinical automation.

Recommended Books

1. M.N. Chatterjea and Rana Shinde, 'Textbook of Medical Biochemistry', Jaypee Brothers.
2. John W. Baynes and Marek Dominiczak, 'Medical Biochemistry (Paperback)', Mosby.
3. Allan Gaw, Michael Murphy, Robert Cowan, Denis O'Reilly, Michael Stewart and James Shepherd, 'Clinical Biochemistry: An Illustrated Colour Text (Paperback)', 3rd Edn., Churchill Livingstone.

**MRSPTU B.Sc. MEDICAL LABORATORY SCIENCE (SEM 5-6) SYLLABUS 2016
BATCH ONWARDS**

4. G. Beckett, S. walker, P. Rae, P. Ashby, 'Clinical Biochemistry', 7th Edn., Blackwell Publishing.

BLOOD BANKING

Subject Code: BMLS1-536

L T P C

Duration: 45 Hrs.

4 0 0 4

Course Objectives

1. The student will learn about blood grouping, transfusion, collection, storage & maintenance.

UNIT- 1

Blood Grouping (12 Hrs.)

Human Blood Group system: ABO Subgroups, Red Cell Antigen, Natural Antibodies, Rh Antigens; Principal of Blood grouping, antigen-antibody reaction; Blood grouping techniques: Cell grouping, Serum grouping; Difficulties in ABO grouping; Inheritance of the Blood groups.

UNIT- 2

Blood Transfusion & Blood Donation (14 Hrs.)

Principal & Practice of blood Transfusion; Guide lines for the use of Blood, Appropriate use of Blood, Quality Assurance; Objectives of Quality Assurance in Blood Transfusion services, Standard operating procedures for usage, donation & storage of blood, screening of donor, compatibility testing, safety, procurement of supplies; Blood donor requirements; Criteria for selection & rejection.

UNIT- 3

Blood Collection & Testing Donor Blood (9 Hrs.)

Blood collection packs; Anticoagulants; Adverse donor reaction; Screening donor's blood for infectious agents - HIV, HCV, HBV, *Trepanoma palladium*, Plasmodium, HTLV.

UNIT- 4

Storage, Transport of Blood and Maintenance of Blood Bank Records (10 Hrs.)

Changes in blood after storage; Gas refrigerator; Lay out of a blood bank refrigerator; Transportation approaches: Blood bank temperature and stock sheet, transfusion request form.

Course Outcomes

Through this course student should be able

1. Different blood grouping aspects.
2. To understand the blood transfusion and donation processes.
3. To learn the blood collection and testing approaches.
4. Explain the blood storage, transport and maintenance.

Recommended Books

1. Haufbrand, 'Essentials of Hematology'.
2. J.V. Dacie, 'Practicals in Hematology'.
3. Lynch, 'Medical Laboratory Technology'.
4. 'Wintrobe's Clinical Hematology'.

**MRSPTU B.Sc. MEDICAL LABORATORY SCIENCE (SEM 5-6) SYLLABUS 2016
BATCH ONWARDS**

MEDICAL LAB. MANAGEMENT

Subject Code: BMLS1-537

**L T P C
3 0 0 3**

Duration: 36 Hrs.

Course Objectives

1. The students will become aware of ethics in a clinical laboratory, Good laboratory practice and Quality Management in a clinical laboratory.

UNIT- 1

Ethical Principles and Good Laboratory Practice (GLP) (10 Hrs.)

Duties to patient, colleagues, society and other professionals; Aims of GLP and accreditation, advantages of accreditation; awareness of general safety precautions; HIV- pre and post-exposure guidelines; patient management for sample collection, transportation and preservation.

UNIT- 2

Sample Analysis & Reporting (8 Hrs.)

Sample accountability, methods of accountability; Factors affecting sample analysis; format of test report, reference range, results from referral laboratories; clinical alerts.

UNIT- 3

Financial Management & Auditing (8 Hrs.)

Awareness of financial management in a clinical laboratory; Horizontal, Vertical and Test audit; Frequency of audit; Documentation.

UNIT- 4

Biomedical Waste Management (10 Hrs.)

Types of waste in clinical laboratories; preliminary disposal and advanced disposal techniques; Standard national and international guidelines for biomedical waste management.

Course Outcomes

Through this course student should be able

1. Explain the various ethical principles and GLP follows in the clinical laboratories on daily basis.
2. To know about the sampling aspects.
3. Explain the financial and auditing processes.
4. To dispose of the biomedical waste.

Recommended Books

1. Sangeeta Sharma, Rachna Agarwal, Sujata Chaturvedi, Rajeev Thakur, 'Medical Laboratory Management Cost- Effective Methods', Viva Books.
2. P.B. Godkar, D.P. Godkar, Bhalani, 'Text Book of Medical Laboratory Technology', Vol.-1 and 2, 3rd Edn., Publishing House, 2005.

HUMAN VALUES AND PROFESSIONAL ETHICS

Subject Code: BHMU0-103

**L T P C
3 0 0 3**

Duration: 36 Hrs.

Course Objectives and Expected Outcomes

To help the students discriminate between what is valuable and what is superficial in the life. To help the students develop the critical ability to distinguish between essence and form in life - this ability is to be developed not for a narrow area or field of study, but for everyday situations in

**MRSPTU B.Sc. MEDICAL LABORATORY SCIENCE (SEM 5-6) SYLLABUS 2016
BATCH ONWARDS**

life, covering the widest possible canvas. To help the students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability; it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing) - it concentrates on providing to its students the skills to do things. In other words, it concentrates on providing “How to do” things. The aspects of understanding “What to do” or “Why something should be done” is assumed. No significant cogent material on understanding is included as a part of the curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course is an effort to fulfill our responsibility to provide our students this significant input about understanding. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. It has been experimented at IITH, IITK and UPTU on a large scale with significant results.

UNIT-I (6 Hrs.)

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration-what is it? - its content and process; “Natural Acceptance” and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT-II (8 Hrs.)

Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient “I” and the material “Body”
Understanding the needs of Self (“I”) and “Body” - *Sukh* and *Suvidha*
Understanding the Body as an instrument of “I” (I being the doer, seer and enjoyer)
Understanding the characteristics and activities of “I” and harmony in “I”
Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure *Sanyam* and *Swasthya*

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction; Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship; Understanding the meaning of *Vishwas*; Difference between intention and competence
Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship

UNIT-III (6 Hrs.)

Understanding the Harmony in the Society (Society Being an Extension of Family)

**MRSPTU B.Sc. MEDICAL LABORATORY SCIENCE (SEM 5-6) SYLLABUS 2016
BATCH ONWARDS**

Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyavastha*)- from family to world family!

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature; Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature; Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space; Holistic perception of harmony at all levels of existence

UNIT-IV (4 Hrs.)

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics:

- Ability to utilize the professional competence for augmenting universal human order,
 - Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
 - Ability to identify and develop appropriate technologies and management patterns for above production systems;
 - Case studies of typical holistic technologies, management models and production systems;
- Strategy for transition from the present state to Universal Human Order:
- At the level of individual: as socially and ecologically responsible engineers, technologists and managers
 - At the level of society: as mutually enriching institutions and organizations

Recommended Books

1. R.R. Gaur, R. Sangal, G.P. Bagaria, 'A Foundation Course in Value Education', **2009**.

Suggested Readings/Books

1. Ivan Illich, 'Energy & Equity', The Trinity Press, Worcester, and Harper Collins, USA, 1974.
2. E.F. Schumacher, 'Small is Beautiful: A Study of Economics as if People mattered', Blond & Briggs, Britain, 1973.
3. A. Nagraj, 'Jeevan Vidya ek Parichay', Divya Path Sansthan, Amarkantak, 1998.
4. Sussan George, 'How the Other Half Die's', Penguin Press. Reprinted 1986, 1991.
5. P.L. Dhar, R.R. Gaur, 'Science and Humanism', Commonwealth Publishers, 1990.
6. A.N. Tripathy, 'Human Values', New Age International Publishers, 2003.
7. Subhas Palekar, 'How to practice Natural Farming', Pracheen (Vaidik) Krishi Tantra Shodh, Amravati, 2000.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 'Limits to Growth - Club of Rome's report', Universe Books, 1972.
9. E. G. Seebauer & Robert L. Berry, 'Fundamentals of Ethics for Scientists & Engineers', Oxford University Press, 2000.
10. M. Govindrajran, S. Natrajan & V.S. Senthil Kumar, 'Engineering Ethics (including Human Values)', Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 'Foundations of Ethics and Management', Excel Books, 2005.
12. B. L. Bajpai, **2004**, 'Indian Ethos and Modern Management', New Royal Book Co., Lucknow, Reprinted 2008.

PARASITOLOGY & VIROLOGY LAB.

Subject Code: BMLS1-538

L T P C
0 0 2 1

EXPERIMENTS

1. Routine stool examination for detection of intestinal parasites with concentration methods: Saline preparation, Iodine preparation, Floatation method, Centrifugation method, Formal ether method, Zinc sulphate method.
2. Identification of adult worms from models/slides: Tapeworm, Ascaris, Hookworms.
3. Malarial parasite: Preparation of thin and thick smears, Staining of smears, Demonstration of various stages of life cycle of malarial parasites from stained slides.
4. Demonstration of fertilized hen egg.
5. Demonstration of virus inoculation routes in fertilized hen egg.

Recommended Books

1. J. Ochei, Arundhti Kolhatkar, 'Medical Laboratory Science: Theory and Practice', McGraw Hill Education.
2. K.D. Chatterjee, 'Text Book of Parasitology', Chatterjee Medical Publishers, Calcutta.

CLINICAL BIOCHEMISTRY- II LAB.

Subject Code: BMLS1- 539

L T P C
0 0 2 1

EXPERIMENTS

1. To perform the Glucose tolerance test of the given sample (GTT).
2. To perform the Insulin tolerance test (ITT).
3. Determination of Uric acid in Urine of the patient.
4. Determination of Creatinine clearance.
5. Determination of Urea clearance.
6. Determination of Serum acid phosphatase.
7. Determination of Serum Alkaline phosphatase.
8. Determination of Serum Lactate dehydrogenase.
9. Determination of Serum CPK
10. Determination of T3, T4 and TSH.

Recommended Books

1. K.L. Mukherjee, 'Medical laboratory Technology', Vol.-III.
2. Richard Luxton, 'Clinical Biochemistry',
3. Barbara H. Estridge et.al, 'Basic Medical Laboratory Techniques'.

BLOOD BANKING LAB.

Subject Code: BMLS1-540

L T P C
0 0 2 1

EXPERIMENTS

1. Screening of blood donor: physical examination including medical history of the Donor.
2. To prepare Acid Citrate Dextrose (ACD) and Citrate Phosphate Dextrose (CPD) Solutions.

**MRSPTU B.Sc. MEDICAL LABORATORY SCIENCE (SEM 5-6) SYLLABUS 2016
BATCH ONWARDS**

3. Collection and preservation of blood for transfusion purpose.
4. Screening of blood for Malaria, Microfilaria, HBsAg, syphilis and HIV.
5. To determine the ABO & Rh grouping.
6. To perform Direct and Indirect Coomb's test.
7. To perform cross matching.

Recommended Books

1. K.L. Mukherjee, 'Medical laboratory Technology', Vol.-I.
2. P.B. Godkar, D.P. Godkar, 'Text Book of Medical Laboratory Technology', Vol. 1 & 2, 3rd Edn., Bhalani Publishing House, 2005.

MEDICAL LAB. MANAGEMENT PRACTICAL

Subject Code: BMLS1- 541

L T P C

0 0 2 1

1. Clinical sample collection e.g. Blood, Urine, Stool examination, Saliva sample, Sputum sample, Semen.
2. Sample accountability: Labeling of sample, making entries in Laboratory records.
3. Reporting results: Basic format of a test report, Release of examination results.
4. Calibration and Validation of Clinical Laboratory instruments.
5. Biomedical waste management in a clinical laboratory: Disposal of used samples, reagents and other biomedical waste.

Recommended Books

1. Sangeeta Sharma, Rachna Agarwal, Sujata Chaturvedi, Rajeev Thakur, 'Medical Laboratory Management Cost- Effective Methods', Viva Books.
2. P.B. Godkar, D.P. Godkar, 'Text Book of Medical Laboratory Technology', Vol. 1 & 2, 3rd Edn., Bhalani Publishing House, 2005.

MRSPTU B.Sc. BIOTECHNOLOGY SYLLABUS 2016 BATCH ONWARDS

Total Contact Hours = 24

Total Marks = 800

Total Credits = 20

SEMESTER 5 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BBOT1-529	Bioinformatics	3	1	0	40	60	100	4
BBOT1-530	Bioanalytical tools	4	0	0	40	60	100	4
BBOT1-531	Enzymology and enzyme technology	4	0	0	40	60	100	4
BBOT1-532	Environmental Biotechnology	4	0	0	40	60	100	4
BBOT1-533	Bioinformatics Lab.	0	0	2	60	40	100	1
BBOT1-534	Bioanalytical Tools Lab.	0	0	2	60	40	100	1
BBOT1-535	Enzymology Lab.	0	0	2	60	40	100	1
BBOT1-536	Environmental Biotechnology Lab.	0	0	2	60	40	100	1
Total		15	1	8	400	400	800	20

Total Contact Hours = 28

Total Marks = 600

Total Credits = 20

SEMESTER 6 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BBOT1-637	IPR, Bioethics and Biosafety	3	1	0	40	60	100	4
BBOT1-638	Food Biotechnology	4	0	0	40	60	100	4
BBOT1-639	Bioprocess Engineering	4	0	0	40	60	100	4
BBOT1-640	Food Biotechnology Lab.	0	0	2	60	40	100	1
BBOT1-641	Bioprocess Engineering Lab.	0	0	2	60	40	100	1
BBOT1-642	Project Work	0	0	12	60	40	100	6
Total		11	1	16	300	300	600	20

BIOINFORMATICS

Subject Code: BBOT1-529

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Objectives:

To introduce bioinformatics concepts, principles, and techniques to students with life science background. To impart knowledge about the existing tools for storage, retrieval, sharing and use of biological data.

Unit-I

History, scope and importance of bioinformatics.

Introduction to Genomics and proteomics – information flow in Biology, DNA sequence data,

experimental approach to genome sequence data, genome information resources, protein sequence and structural data, protein information resources.

Bioinformatic-biological data analysis and application, sequence data bases, NCBI model, File format.

Unit-II

Sequence Alignment and Database: Information retrieval systems and Data submission, Entrez, SRS; BankIt, Database Scanning and Sequence similarity searches, algorithm BLAST, BLAST programs (BLASTP, BLASTN), FASTA, multiple sequence alignment.

Unit-III

Nucleotide Sequence Databases: Composition, organization and structure of data entries, INSDC, Genbank, EMBL,

Primary and Secondary Protein Databases: Composition, organization and structure of data entries, IPSCD, Swiss-Prot, TrEMBL PIR, UniProt, PDB, CATH, SCOP, PROSITE, Pfam.

Unit-IV

Phylogenetic Analysis: Multiple sequence alignment tools - clustalW; Phylogenetic analysis and methods - overview of Maximum Parsimony method, Tree confidence; Analysis tools – Phylip.

Genome Annotation: Pattern and repeat finding, Gene identification tools, Detecting Open Reading Frames.

Recommended Books:

1. P. Baldi, S. Brunak, 'Bioinformatics: The Machine Learning Approach', 2nd Edn., Cambridge, Mass: MIT Press, 2001.
2. A.D. Baxevanis, B.F.F. Ouellette, 'Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins', 3rd Edn., N.J. Hoboken: Wiley Interscience, 2005.
3. R.F. Doolittle, 'Computer Methods for Macromolecular Sequence Analysis', San Diego: Academic Press, 1996.
4. D. Higgins, W.R. Taylor, 'Bioinformatics: Sequence, Structure and Databanks: A Practical Approach', Oxford; NY: Oxford University Press, 2000.

BIOANALYTICAL TOOLS

Subject Code: BBOT1-530

**L T P C
4 0 0 4**

Duration: 45 Hrs.

Objectives:

To understand the various tools used in modern day biotechnological processes.

Unit-I

Microscopy: Simple, compound, phase contrast microscopy, fluorescence, electron microscopy (TEM and SEM), and atomic force microscopy.

Spectroscopy: Absorption and emission spectra- UV, Visible, IR, NMR, ORD/CD, atomic absorption and plasma emission spectroscopy, X-ray diffraction.

Unit-II

Centrifugation Techniques: Basic principle of centrifugation, different types of centrifuges and their uses, preparative and analytical ultra-centrifuges, types of rotors: swing bucket and fixed angle rotors, separation by differential and density gradient centrifugation.

Unit-III

Chromatography Techniques: principle of chromatography, Paper chromatography, thin layer chromatography, column chromatography: silica and gel filtration, affinity and ion exchange chromatography, gas chromatography, HPLC.

Unit-IV

Separation and Analysis by Electrophoresis: General principle, support media, types of electrophoresis, Starch-gel, polyacrylamide gel (native and SDS-PAGE), agarose-gel electrophoresis, pulse field gel electrophoresis, immuno- electrophoresis, isoelectric focusing, 2D-PAGE, Western blotting.

Radioisotopy: Principles and applications of tracer techniques in biology, radioactive isotopes and half-life of isotopes, Autoradiography, Liquid scintillation counters.

Recommended Books:

1. G. Karp, 'Cell and Molecular Biology: Concepts and Experiments', 6th Edn., John Wiley & Sons. Inc., 2010.
2. D. Freifelder, 'Physical Biochemistry. Applications to Biochemistry & Molecular Biology', W.H. Freeman & Co., 1982.
3. E.D.P. De Robertis and E.M.F. De Robertis, 'Cell and Molecular Biology', 8th Edn., Lippincott Williams and Wilkins, Philadelphia, 2006.
4. G.M. Cooper and R.E. Hausman, 'The Cell: A Molecular Approach', 5th Edn., ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA, 2009.
5. W.M. Becker, L.J. Kleinsmith, J. Hardin and G.P. Bertoni, 'The World of the Cell', 7th Edn., Pearson Benjamin Cummings Publishing, San Francisco, 2009.
6. K. Wilson and J. Walker, 'Practical Biochemistry: Principles and Techniques', Cambridge University Press, U.K., 1995.

ENZYMOLGY AND ENZYME TECHNOLOGY

Subject Code: BBOT1-531

L T P C

Duration: 45 Hrs.

4 0 0 4

Unit-I

Introduction to Enzymes: Structure, evolution and its basis, Nomenclature, Classification and Characteristics of enzymes, Enzyme specificity, Cofactors, Co-enzyme and Prosthetic group.

Unit-II

Mechanism of Enzyme Action: Nature of active site, identification of functional groups at active site, enzyme substrate complex, Activation of enzymes, covalent modification, allosteric interaction, multienzyme complexes.

Unit-III

Kinetic Characterization: Kinetics of single and bi-substrate enzyme catalysed reactions, Michaelis Menten equation and determination of K_m and V_{max} values, Lineweaver-Burk plot, Hanes Plot. Enzyme inhibition kinetics.

Unit-IV

Pharmaceuticals: Role of soluble and immobilized enzymes in production of antibiotics, steroids, and other important intermediates of biotechnological industry.

Applications in Food Industry: Soluble and immobilized enzymes - food production and processing, amylases, pectinases, proteases, lipases,

Enzyme Engineering: *In vitro* approaches to improve functional efficiency; Recombinant enzymes.

Recommended Books:

1. N.C. Price and L. Stevens, 'Fundamentals of Enzymology: The cell and Molecular Biology of Catalytic Proteins', Oxford University, 2000.
2. P.C. Engel, 'Enzymology Lab Fax', Academic Press, 2003.
3. A. Fersht, 'Enzyme Structure and Function', W.H. Freeman and Co., NY, 1999.
4. Rehm, Reed and A. Phuler, 'Enzymes, Biomass, Food and Feed (Biotechnology) 2nd Edn., Vol. 9, Wiley VCH, Berlin, 2001.
5. H. Bisswanger and L. Bubenheim, 'Enzyme Kinetics: Principles and Methods', 2002.
6. T. Godfrey and S. May, 'Industrial Enzymology: The Application of Enzymes in Industry', McMillan Publishers, 2001.

ENVIRONMENTAL BIOTECHNOLOGY

Subject Code: BBOT1-532

L T P C
4 0 0 4

Duration: 45 Hrs.

Unit-I

Introduction to Environmental Pollution: Nature of pollutants, Types of pollution: air, water, soil, Marine Pollution, Noise Pollution, Thermal Pollution, Nuclear Hazards, Electronic Waste.

Unit-II

Environmental Treatment Technologies for Waste Water and Air: Physical and chemical methods, aerobic, activated sludge treatment, aerated ponds, lagoons, trickling filters, rotating biological contactors. Up flow anaerobic sludge blanket bioreactor (UASB), Anaerobic filter reactor, contact reactor.

Unit-III

Solid waste management by composting, vermicomposting, sanitary landfills, treatment of hazardous and biomedical waste, management of E-waste, Methanogenesis
Biodegradation of organic pollutants (organic solvents, pesticides) and Bioremediation technology for environmental pollutants.

Unit-IV

Biogas technology: biogas technology raw materials, biochemistry, microbiology, biogas plant, factors affecting biogas production and its status in India. Agri-waste and plastic waste management, Biomining and bioleaching, Plastic menace, biodegradable plastics. Biosafety levels.

Recommended Books:

1. R.C. Dubey, 'A Text Book of Biotechnology', S. Chand & Company Ltd., New Delhi, 2002.

2. P.K. Goel, 'Advances in Industrial Waste Water Treatment', Technoscience Publications, **1999**.
3. E. Bruce Rittmann and L. Perry, 'Environmental Biotechnology: Principles and Applications', Mc. Corty, McGraw Hill Publications, New York, 2000.
4. Hans-Joachim Jordening and Josef Winter, 'Environmental Biotechnology: Concepts and Applications', Wiley-VCH Verlag, 2005.

BIOINFORMATICS LAB.

Subject Code: BBOT1-533

L T P C

0 0 2 1

1. Sequence information resource
2. Understanding and use of various web resources: EMBL, Genbank, Entrez, Unigene,
3. Protein information resource (PIR)
4. Understanding and using: PDB, Swissprot, TREMBL
5. Using various BLAST and interpretation of results.
6. Retrieval of information from nucleotide databases.
7. Sequence alignment using BLAST.
8. Multiple sequence alignment using Clustal W and other programs
9. Phylogenetic analysis
10. Gene finder tools (Genscan GRAIL etc)
11. Protein structure prediction, protein modelling and docking.

Recommended Books:

1. Z. Ghosh and M. Bibekanand, 'Bioinformatics: Principles and Applications'. Oxford University Press. ISBN 13: 9780195692303, **2008**.
2. J. Pevsner, 'Bioinformatics and Functional Genomics', 2nd Edn., Wiley Blackwell, ISBN: 978-0-470-08585-1, **2009**.
3. A.M. Campbell, L.J. Heyer, 'Discovering Genomics, Proteomics and Bioinformatics', 2nd Edn., Benjamin Cummings. ISBN-13: 978-0805382198, **2006**.

BIOANALYTICAL TOOLS LAB.

Subject Code: BBOT1-534

L T P C

0 0 2 1

1. Determine the absorption spectra of a biological sample with single/double beam spectrophotometer & verification of Beer's Lambert law.
2. Introductory microscopy experiments. Working of light, phase contrast, fluorescence and inverted microscope. Demonstration of TEM and SEM.
3. Differential centrifugation for separation of biomolecules.
4. To study separation of bio-molecules by paper chromatography.
5. To study separation of bio-molecules by thin layer chromatography.
6. Separation of proteins by ion-exchange column chromatography
7. Separation of proteins by affinity column chromatography.
8. Qualitative and quantitative analysis of DNA sample
9. Preparation of standard curve of protein
10. Preparation of standard curve of DNA.
11. Casting of vertical and horizontal gels for electrophoresis.
12. Separation of bio-molecules by vertical and horizontal gel electrophoresis

ENVIRONMENTAL BIOTECHNOLOGY LAB.

Subject Code: BBOT1-535

**L T P C
0 0 2 1**

1. Estimation of dissolved oxygen in water samples
2. Determination of BOD in polluted water sample
3. Determination of COD in polluted water
4. Estimation of Chlorine in water samples
5. Detection of coliform bacteria in water samples
6. Estimation of NOX concentration.
7. Estimation of SOX concentration.
8. Isolation of pesticide degrading microorganisms from soil
9. Biosorption of dyes from effluents by biomass and its recycling

ENZYMOLGY LAB.

Subject Code: BBOT1-536

**L T P C
0 0 2 1**

1. Estimation of α -amylase activity from saliva.
2. Assay of acid phosphatase activity.
3. Effect of temperature on enzyme activity.
4. Effect of pH on enzyme activity
5. Effect of substrates concentration on the activity of enzyme and determination of K_m and V_{max} of enzyme.
6. Demonstration/practical on competitive, non-competitive, uncompetitive enzyme inhibition using LB plot.
7. Screening of microorganisms producing industrial enzymes.
8. Immobilization of enzyme by different methods and their reuse.

Books Recommended:

1. D.T. Plummer, 'An Introduction of Practical Biochemistry', 3rd Edn., Tata McGraw Hill, Publishers Co. Ltd., New Delhi, 1998.
2. D.D. Bansal, R. Khardori & M.M. Gupta, 'Practical Biochemistry', Standard Publication, Chandigarh, 1985.
3. S.K. Sawhney and Randhir Singh, 'Introductory Practical Biochemistry', Narosa Publishing House, New Delhi, 2001.

IPR, BIOETHICS AND BIOSAFETY

Subject Code: BBOT1-637

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Objectives: This course will also make the students aware of the a) law pertaining to biotechnology, how to apply for national/international patent, Biotech agreements between various countries etc.(b) ethical issues concerned with the field of Biotechnology, (c) bioterrorism and (d) ways to handle/dispose-of biohazard material.

UNIT-I

Ownership of Tangible and Intellectual Property. Basic requirements of patentability, patentable subject matter, novelty and the Public Domain; Non obviousness. Introduction to Indian Patent Law. World Trade Organization and its related intellectual property provisions. WTO agreement and TRIPS, Patent Cooperation treaty, Intellectual/Industrial property and its legal protection in research, design and development.

UNIT-II

Patenting in Biotechnology, economic, ethical and depository considerations. Compulsory licensing, Patent infringements and revocation, Patents: Disclosure Requirements, Collaborative research, competitive research, Patent Litigation: Substantive Aspects of Patent Litigation, Procedural Aspects of Patent Litigation, Recent Development in Patent System, Budapest treaty.

UNIT-III

Biosafety – Introduction to biosafety and health hazards concerning biotechnology, The Cartagena protocol on biosafety. Introduction to the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP).

UNIT-IV

Bioethics – Necessity of Bioethics, different paradigms of Bioethics – National & International. Ethical issues against the molecular technologies. Bioterrorism, Social and ethical implication of biological weapons

Recommended Books:

1. P.K. Gupta, 'Elements of Biotechnology', Rastogi Publications, Meerut, ISBN- 978-81-7133-937-2, **2004**.
2. N. Subbaram, 'What Everyone should know about Patents?', Pharma Book Syndicate, Hyderabad, ISBN 13: 9788188449101, **2003**.
3. J. Watal, 'Intellectual Property Rights in the WTO and Developing Countries', Oxford University Press, New Delhi, **2001**.
4. M.K. Sateesh, 'Intellectual Property Bulletin', 'Bioethics and Biosafety', I.K. International Pvt. Ltd., ISBN-13: 978-8190675703, **2010**.
5. Sree Krishna V. 'Bioethics and Biosafety in Biotechnology', New Age International Publishers, ISBN- 9788122422481, **2007**.

FOOD BIOTECHNOLOGY

Subject Code: BBOT1-638

L T P C

Duration: 45 Hrs.

4 0 0 4

Objectives: This course enlightens the students about the role of biotechnology in the Food Sector. The major emphasis is on a) the role of microbes in the preparation of traditional food, alcoholic beverages and single cell proteins; b) microbial diseases spread through foods and their detection techniques c) various strategies used for preservation of foods.

Unit-I

History background of food technological advances, Composition of food, Growth of microorganisms in food: Intrinsic and extrinsic factors affecting food quality, Traditional fermented foods: Bread, cocoa, coffee, tea, sauerkraut, cheese, butter, yoghurt, meat, fish, etc.

Unit-II

Alcoholic Beverages: Beer, wine and whisky, Value addition products: production of high fructose syrup, invert sugars etc., Edible fungus: different types of edible mushrooms and their food value

Unit-III

Nutraceutical application of Spirulina, yeast etc. as food supplements, Improvement of food resources: Golden rice, Potato etc., Food and water borne disease: Gastroenteritis, Diarrhoea, Shigellosis, Salmonellosis, Typhoid, Cholera, Polio, Hepatitis etc.

Unit-IV

Food Borne Intoxications: Staphylococcal, Bacillus, Clostridium etc., Detection of food borne pathogens, techniques in food preservation and storage

Recommended Books:

1. G.F.P. Lopez, G. Canas, E.V. Nathan, 'Food Sciences and Food Biotechnology', CRC, **2003**.
2. M. Ruse, D. Castle, 'Genetically Modified Foods', Prometheus Book Publication, ISBN-13: 978-1573929967, **2002**.
3. H.G. Schwartzberg, M.A. Rao, 'Biotechnology and Food Process Engineering', Marcel Dekker, **1990**.
4. James M. Jay, M.J. Lossner, D.A. Golden, 'Modern Food Biotechnology', 7th Edn., **2005**.
5. N.N. Potter, J.H. Hotchkiss, 'Food Science', 5th Edn., ISBN 978-0-8342-1265-7, **2005**.

BIOPROCESS ENGINEERING

Subject Code: **BBOT1-639**

L T P C
4 0 0 4

Duration: 45 Hrs.

Unit-1

Fundamental principles of biochemical engineering. Applications of physical and chemical laws on biological samples, Principles of upstream and downstream processing; Unit operations involved in bioprocesses. *Bioreactors:* Designing and development of a bioreactor; Aeration and agitation systems for bioreactors; Bioreactor configurations; Mode of operation-batch, fed batch and continuous; Scale-up of bioprocess.

Unit-II

Simple kinetics of microbial growth, yield coefficient, doubling time, specific growth rate, substrate inhibition kinetics, product inhibition kinetics, metabolic and biomass productivities.

Transport Phenomenon in Bioreactors: Mass transfer coefficient (KLa) for gases and liquids, determination of KLa, factors affecting KLa value in bioprocesses; Heat transfer-general considerations; Dimensionless groups; Fluid rheology.

Unit-III

Thermal death kinetics of batch and continuous sterilization of media; air and media sterilizations, design of batch sterilization process, Del factor, sterilization cycle, continuous sterilization process, sterilization of fermenters.

Unit-IV

Growth and product formation by recombinant cells, thermodynamics and stoichiometric aspects of microbial processes. Finishing techniques in bioprocesses: Distillation; Electrodialysis; Evaporation; Drying; Crystallography.

Recommended Books:

1. P.F. Stanbury, A. Whitaker and S.J. Hall, 'Principles of Fermentation Technology', 2nd Edn., Pergamon Press, Oxford, **2001**.
2. M.Y. Young, 'Comprehensive Biotechnology', Vol. 1-4), Pergamon Press, Oxford, **2000**.
3. M.Y. Young, 'Environmental Biotechnology, Principles & Applications', Kluwer Academic Publications, New Delhi, **1996**.
4. J.E. Bailary and D.F. Ollis, 'Biochemical Engineering Fundamentals', McGraw Hills, N.Y., **1986**.
5. S.J. Pirt, 'Principles of Microbes and Cell Cultivations', Blackwell Scientific Publication, London, **1985**.

FOOD BIOTECHNOLOGY LAB.

Subject Code: BBOT1-640

**L T P C
0 0 2 1**

PRACTICALS

1. Preparation and estimation of casein content of milk
2. Estimation of lactose concentration in milk
3. Determination of pasteurization of milk by Alkaline phosphatase test
4. To check the microbial load in milk by Methylene blue dye reduction test
5. To enumerate microorganisms in food samples by Direct Microscopic Count
6. Isolation of Lactic Acid Bacteria from curd
7. Study of microflora associated with fresh and spoilt fruits and vegetables.

BIOPROCESS ENGINEERING LAB.

Subject Code: BBOT1-641

**L T P C
0 0 2 1**

1. To study the growth curve of microorganism.
2. To determine the specific growth rate and generation time of a bacterium during
3. submerged fermentation.
4. Demonstration of sterilization of fermenter and other accessories.
5. To study the effect of temperature, pH and aeration on growth of microbes.
6. Production of an enzyme in a Bioreactor/shaking flask.
7. Determination of thermal death kinetics of batch sterilization

Recommended Books:

1. J.G. Cappuccino, N. Sherman, 'Microbiology: A Laboratory', Pearson Benjamin Cummings, 2007.
2. D.T. Plummer, 'An Introduction to Practical Biochemistry', Tata McGraw Hill Publishers Co. Ltd., New Delhi, 2004.
3. D.D. Bansal, R.K. Hardori, M.M. Gupta, 'Practical Biochemistry', Standard Publication Chandigar, 1985.

1 st Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BMAT1-101	Calculus-I	4	1	0	40	60	100	5
BMAT1-102	Algebra-I	4	1	0	40	60	100	5
BMAT1-103	Analysis-I	4	1	0	40	60	100	5
BHUM1-101	English	4	0	0	40	60	100	4
BCAP1-101	Fortran Programming	4	0	0	40	60	100	4
BCAP1-102	Fortran Programming Lab.	0	0	2	60	40	100	1
Total		20	3	2	260	340	600	24

CALCULUS-I

Subject Code: BMAT1-101

**L T P C
4 1 0 5**

Duration: 55 Hrs.

UNIT-I (14 Hrs.)

Basic concept of limit and continuity, Properties of limit and classification of discontinuities, Properties of continuous functions, Differentiability and differentials, Successive differentiation and Leibnitz theorem, Derivatives of higher order, nth derivative of well-known functions.

UNIT-II (14 Hrs.)

Concavity, Convexity, Points of inflexion, Increasing and decreasing function, Asymptotes, Polar curves, Multiple points, Tracing of Cartesian curves, Idea of some well-known parametric and polar curves, Curvature of a curve at a point, Radius of curvature for Cartesian, Parametric, Polar forms, Centre of curvature.

UNIT-III (15 Hrs.)

Partial differentiation –Function of two variables, Partial derivatives of higher order, Homogeneous functions, Euler's theorem and its extension (with proof), Composite functions, Total derivative, Differentiation of implicit functions and composite functions, Jacobians and its properties.

UNIT-IV (12 Hrs.)

Tangent plane and normal to a surface, Maxima and Minima of functions of two variables, working rule to find the extreme values of a function $z = f(x, y)$, Lagrange's method of undetermined multipliers, Gradient, Curl and Divergence, Geometrical interpretation and basic properties, Directional Derivative.

Recommended Textbooks/References:

1. G.B. Thomas, M.D. Weir, J. Hass Thomas, 'Calculus', 12th Edn., Pearson Education.
2. Gorakh Prasad, 'Integral Calculus', 14th Edn., Pothishala Private Ltd., Allahabad, Reprint **2007**.
3. Zafar Ahsan, 'Differential Equations and their Applications', 2nd Edn., Prentice Hall of India Pvt. Ltd., New Delhi.
4. B.S. Grewal, 'Higher Engineering Mathematics', 35th Edn., Khanna Publishers, **2000**.
5. Erwin Kreyszig, 'Advanced Engineering Mathematics', 9th Edn., John Wiley & Sons, **2006**.

ALGEBRA-I

Subject Code: BMAT1-102

**L T P C
4 1 0 5**

Duration: 55 Hrs.

UNIT-I (14 Hrs.)

Matrices, Row and Column Space of Matrix, Row reduction and echelon forms, Rank, Systems of linear equations, Gaussian elimination, Determinants and their properties, Cramer's rule, Vector equations, The matrix equation $AX = B$, Solution sets of linear systems (Homogeneous & Non-homogeneous), Applications of linear systems.

UNIT-II (14 Hrs.)

Eigenvalues, Eigenvectors, Characteristic polynomial, Minimal polynomial, Characteristic equation of a matrix, Cayley-Hamilton theorem and its use in finding the inverse of a matrix, Diagonalization, Linear transformations, Representation of linear transformations by matrices, Change of basis, Rank-nullity theorem, Minimal polynomial.

UNIT-III (14 Hrs.)

Binary space, Definition of group, Ring and field, Vector space, Subspace, Linear combination, Linear span, Dimension of vector space, Direct sum of spaces, Quotient space, Homomorphism & Isomorphism of vector space.

UNIT-IV (13 Hrs.)

Linear Transformation, Null space, Range space, Product of linear transformation, Singular and non-singular transformation, Canonical forms, Jordan forms, Triangular forms, Rank-nullity theorem, Eigen value & Eigen vectors of linear transformation.

Recommended Books:

1. Chandrika Prasad, 'Text Book on Algebra and Theory of Equations', Pothishala Pvt. Ltd.
2. I.N. Herstein, 'Topics in Algebra', 2nd Edn., Vikas Publishing House, 1976.
3. 'Linear Algebra', Schaum Outline Series.
4. H.S. Hall and S.R. Knight, 'Higher Algebra', H.M. Publications, 1994.
5. Shanti Narayan, 'A Text Books of Matrices'.

ANALYSIS-I

Subject Code: BMAT1-103

**L T P C
4 1 0 5**

Duration: 55 Hrs.

UNIT-I (14 Hrs.)

Real Numbers and Sequences of Real Numbers

Preliminaries: Sets and Functions, Mathematical induction, Finite and infinite sets.

Algebraic and order properties of \mathbb{R} , Absolute value and the real line, Completeness property of \mathbb{R} , Applications of supremum property, Archimedean property, Density of rational numbers in \mathbb{R} , Intervals- Characterization theorem, Nested intervals, Nested interval property, The uncountability of \mathbb{R} , Binary and decimal representation of real numbers.

A sequence in \mathbb{R} , The limit of a sequence, Convergence of a sequence, Uniqueness of limits, Limit theorems, Monotone sequence, Euler's number, Subsequence, Divergent criteria, Monotone subsequence theorem, Bolzano-Weierstrass theorem, Cauchy sequence, Cauchy convergence criterion, Properties of divergent sequences.

UNIT-II (14 Hrs.)

Infinite Series

Infinite series- partial sums, Convergence of infinite series, the n th term test, Cauchy criterion for series, Examples including the geometric series, The harmonic series, P - series, The alternating harmonic series, Comparison test and limit comparison test.

Absolute convergence, Grouping and rearrangements of series, Tests for absolute convergence- The root test, the ratio test, the integral test, The Rabbe's test, alternating series, Alternating series test, Dirichlet test, Abel's test.

UNIT-III (14 Hrs.)

Limits and Continuous Functions

Cluster point of a subset of \mathbb{R} , Limit of a function at a cluster point of a set, Sequential criterion for the limits, Divergence criterion, Limit theorems, squeeze theorem, left handed and right handed limits, Infinite limits.

Continuous functions, Sequential criterion of continuity, Discontinuity criterion, Combinations of continuous functions- sum, Difference, Product and quotient and compositions.

Continuous functions on intervals, Boundedness theorem, Maximum-Minimum theorem, Bolzano's Intermediate value theorem, Preservation of intervals theorem,

Uniform continuity, Non-uniform continuity criteria, Uniform continuity theorem, Lipschitz functions, Continuous Extension theorem, Approximations of continuous functions by step functions and by piecewise linear functions, Weierstrass Approximation theorem. Monotone and inverse functions, The n th root function and rational powers.

UNIT-IV (13 Hrs.)

Differentiation

Differentiability and Derivatives of real functions, Differentiability and Continuity, Basic properties of the derivatives, Caratheodory theorem, Chain rule, Inverse functions and their derivatives, Rolle's theorem, Mean Value theorem, Applications of mean value theorem, Intermediate value property of derivatives, Darboux's theorem, L'hospital rules, Taylor's theorem, Applications of Taylor's theorem, Convex functions, Newton's method, Differentiation of vector valued functions.

Recommended Books:

1. Robert G. Bartle and Donald R. Sherbert, 'Introduction to Real Analysis', 3rd Edn., John Wiley & Sons, Inc., 2000.
2. Walter Rudin, 'Principles of Mathematical Analysis', 3rd Edn., McGraw Hill, 1976.
3. S.C. Malik and Savita Arora, 'Mathematical Analysis', New Age International Publisher, Reprint 2008.
4. T.M. Apostol, 'Mathematical Analysis', 2nd Edn., Narosa Publishing House, Reprint 2002.

ENGLISH

Subject Code: BHUM1-101

**L T P C
4 0 0 4**

Duration: 55 Hrs.

UNIT-I (8 Hrs.)

Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context.

Barriers to Communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers.

Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.

UNIT-II (8 Hrs.)

Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication.

Communication Styles: Introduction, The Communication Styles Matrix with example for each - Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style.

UNIT-III (8 Hrs.)

Basic Listening Skills: Introduction, Self-Awareness, Active Listening, becoming an Active Listener, Listening in Difficult Situations.

Effective Written Communication: Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication.

Writing Effectively: Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message.

UNIT-IV (12 Hrs.)

Interview Skills: Purpose of an interview, Do's and Don'ts of an interview

Giving Presentations: Dealing with Fears, planning your Presentation, structuring your Presentation, Delivering your Presentation, Techniques of Delivery

Group Discussion: Introduction, Communication skills in group discussion, Do's and Don'ts of group discussion.

Recommended Books:

1. Stephen. P. Robbins, 'Organizational Behaviour', 1st Edn., Pearson, 2013.
2. Gopala Swamy Ramesh, 'The Ace of Soft Skills: Attitude, Communication and Etiquette for Success', 5th Edn., Pearson, 2013.
3. Deborah Dalley, Lois Burton, Margaret, Green Hall, 'Developing Your Influencing Skills', 1st Edn., Universe of Learning Ltd., 2010.
4. Barun K. Mitra, 'Personality Development and Soft Skills', 1st Edn., Oxford Press, 2011.
5. Butter Field, 'Soft Skill for Everyone', 1st Edn., Cengage Learning India Pvt. Ltd., 2011.
6. Francis Peters S.J., 'Soft Skills and Professional Communication', 1st Edn., McGraw Hill Education, 2011.
7. John Adair, 'Effective Communication', 4th Edn., Pan MacMillan, 2009.

8. Aubrey Daniels, 'Bringing out the Best in People', 2nd Edn., McGraw Hill, 1999.

FORTRAN PROGRAMING

Subject Code: BCAP1-101

L T P C
4 0 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Computing, Introduction to Digital Computers, Operating Systems, Linux, Windows and other Operating Systems, Open Source Foundation and GNU, Programming and Problem Solving.

UNIT- II (13 Hrs.)

Basic FORTRAN, Introduction to FORTRAN, Data Types, Constants, and Variables, Operation and Intrinsic Functions, Expressions and Assignment Statements, Simple Input/Output, Program Structure, Example: Simple Unit Conversion.

UNIT- III (12 Hrs.)

Control Constructs, Logical Operators and Logical Expression, If Constructs, The Case Construct, Do Loops, Programming Units, Types of Programming Units, Main Program, External Procedures, Internal Procedures, Modules, Subroutines, Functions, Arguments of Procedures, Scope of Variables, Recursion, Arrays and Array Operations, Arrays in Fortran, Array Processing, Array Constructors, Mask Array.

UNIT- IV (10 Hrs.)

Fortran I/O and External Files, Formatted Output, Formatted Input, File Processing User Defined Types and Structures, Derived Types, Type Bound Procedures, Polymorphism Graphics (Gnu plot), The Gnu plot Scientific Graphic Library, Linking Fortran Programs to Gnu Plot Graphic Library.

Recommended Books:

1. Jane Sleightholme, Ian Chivers, 'Introduction to Programming with FORTRAN', Springer, 2003.
2. V. Rajaraman, 'Computer Programming in FORTRAN 77', PHI Learning Pvt. Ltd., 1997.

FORTRAN PROGRAMMING LAB.

Subject Code: BCAP1-102

L T P C
0 0 2 1

Operational Knowledge and Implementation of numerical methods & statistical Techniques using FORTRAN Programming Language.

1. **Input-output statements:** formatted and non-formatted statements
2. **Decision Making:** switch, if-else, nested if, else-if ladder
3. **Jumping Statements:** break, continue, goto
4. **Loops:** while, do-while, for
5. **Functions:** definition, declaration, variable scope, parameterized functions, return statement
6. Call by value, call by reference, recursive functions
7. **Arrays:** Array declarations, Single and multi-dimensional
8. Strings and string functions

MRSPTU M.Sc. PHYSICS SYLLABUS 2018 BATCH ONWARDS

1 st Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject	L	T	P	Internal	External	Total	
MPHYS1-101	Classical Mechanics	4	0	0	40	60	100	4
MPHYS1-102	Statistical Physics	4	0	0	40	60	100	4
MPHYS1-103	Mathematical Physics	4	0	0	40	60	100	4
MPHYS1-104	Electronics	4	0	0	40	60	100	4
MPHYS1-105	Electronics Lab	0	0	6	60	40	100	3
MPHYS1-106	Computer Programming Lab.	0	0	6	60	40	100	3
Total		16	0	12	280	320	600	22

2 nd Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject	L	T	P	Internal	External	Total	
MPHYS1-207	Quantum Mechanics –I	4	0	0	40	60	100	4
MPHYS1-208	Electrodynamics-I	4	0	0	40	60	100	4
MPHYS1-209	Atomic & Molecular Physics	4	0	0	40	60	100	4
MPHYS1-210	Condensed Matter Physics-I	4	0	0	40	60	100	4
MPHYS1-211	Advanced Optics and Spectroscopy Lab.	0	0	6	60	40	100	3
MPHYS1-212	Condensed Matter Lab.	0	0	6	60	40	100	3
MPHYS1-213	Seminar-I	0	0	2	100	0	100	1
Total		16	0	14	380	320	700	23

MRSPTU

MRSPTU M.Sc. PHYSICS SYLLABUS 2018 BATCH ONWARDS

3 rd Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject	L	T	P	Internal	External	Total	
MPHYS1-314	Nuclear Physics	4	0	0	40	60	100	4
MPHYS1-315	Quantum Mechanics –II	4	0	0	40	60	100	4
MPHYS1-316	Condensed Matter Physics-II	4	0	0	40	60	100	4
MPHYS1-317	Nuclear Physics Lab	0	0	6	60	40	100	3
MPHYS1-318	Seminar-II	0	0	2	100	0	100	1
Departmental Elective-I (Choose any one)		4	0	0	40	60	100	4
MPHYS1-356	Advanced Mathematical Physics							
MPHYS1-357	Science of Renewable Energy Sources							
MPHYS1-358	Fibre Optics and Laser Technology							
MPHYS1-359	Microprocessor							
Open Elective-I		3	0	0	40	60	100	3
Total		19	0	8	360	340	700	23

4 th Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject	L	T	P	Internal	External	Total	
MPHYS1-419	Particle Physics	4	0	0	40	60	100	4
MPHYS1-420	Electrodynamics-II	4	0	0	40	60	100	4
MPHYS1-421	Advanced Physics Lab.	0	0	6	60	40	100	3
Departmental Elective-II (Choose any one)		4	0	0	40	60	100	4
MPHYS1-460	Nuclear Accelerators, Reactors and Detectors							
MPHYS1-461	Radiation Physics							
Departmental Elective-III (Choose any one)		4	0	0	40	60	100	4
MPHYS1-462	Physics of Materials							
MPHYS1-463	Nano Physics							
MPHYS1-464	Soft Matter Physics							
MPHYS1-422	Dissertation#	0	0	8	80	120	200	8
Open Elective-II		3	0	0	40	60	100	3
Total		19	0	14	260	340	600	22

Sem.	Marks	Credits
I	600	22
II	700	23
III	700	23
IV	600	22
Total	2600	90

Departmental Elective: Subject to the availability of teacher and minimum 10 students as per university guidelines.

Open Elective: Student must choose open elective subject offered by other department.

Dissertation: Maximum 15% of the sanctioned strength of the students will be allotted dissertation on the basis of their option and percentage of marks in M.Sc.1st year examination, and according to the consent of the faculty in the Department. Maximum students guided by each faculty cannot be more than two.

The students who have not been allotted dissertation will have to opt for Department Elective-II and Department Elective-III.

CLASSICAL MECHANICS**Subject Code: MPhys1-101****L T P C
4 0 0 4****Duration: 45 Hrs.****UNIT--1****1. Lagrangian and Hamilton's Formulation (12 Hrs.)**

Mechanics of a system of particles; constraints of motion, generalized coordinates, D'Alembert's Principle and Lagrange's velocity dependent forces and the dissipation function, Applications of Lagrangian formulation, Calculus of variations, Hamilton's principle, Lagrange's equation from Hamilton's principle, extension to non-holonomic systems, advantages of variational principle formulation, symmetry properties of space and time and conservation theorems.

UNIT--2**2. Rigid Body Motion (11 Hrs.)**

Independent co-ordinates of rigid body, orthogonal transformations, Eulerian Angles and Euler's theorem, infinitesimal rotation, Rate of change of a vector, Coriolis force, angular momentum and kinetic energy of a rigid body, the inertia tensor, principal axis transformation, Euler equations of motion, Torque free motion of rigid body, motion of a symmetrical top.

UNIT- 3**3. Small Oscillations and Hamilton's Equations (11 Hrs.)**

Small Oscillations: Eigen value equation, Free vibrations, Normal Coordinates, Vibrations of a triatomic molecule (small oscillation). Legendre Transformation, Hamilton's equations of motion, Cyclic-co-ordinates, Hamilton's equations from variation principle, Principle of least action.

UNIT- 4**4. Canonical Transformation and Hamilton-Jacobi Theory (11 Hrs.)**

Canonical transformation and its examples, Poisson's brackets, Equations of motion, Angular momentum, Poisson's Bracket relations, Infinitesimal canonical transformation, Conservation Theorems. Hamilton-Jacobi equations for principal and characteristic functions, Action-angle variables for systems with one-degree of freedom.

Recommended Books:

1. H. Goldstein, C. Poole and J. Safko, 'Classical Mechanics', Pearson Education Asia, New Delhi.
2. K.C. Gupta, 'Classical Mechanics of Particles and Rigid Bodies', Wiley Eastern, New Delhi.
3. L.N. Hand and J.D. Finch, 'Analytical Mechanics', Cambridge University Press, Cambridge.
4. L.D. Landau and E.M. Lifshitz, 'Mechanics', Pergamon, Oxford.
5. N.C. Rana and P.J. Joag, 'Classical Mechanics', Tata McGraw Hill, New Delhi.
6. S.L. Gupta; V. Kumar; H.V. Sharma, 'Classical Mechanics', Pragati Parkashan, Meerut.

STATISTICAL PHYSICS**Subject Code: MPhys1-102****L T P C
4 0 0 4****Duration: 45 Hrs.****UNIT--1****Statistical Basis of Thermodynamics (10 Hrs.)**

Foundation of statistical mechanics, macroscopic and microscopic states, contact between statistics and thermodynamics, classical ideal gas, Entropy of mixing and Gibbs paradox, Phase space and Liouville's theorem.

UNIT--2

Ensemble Theory (12 Hrs.)

Micro-canonical ensemble theory and its application to ideal gas of monatomic particles; Canonical ensemble and its thermodynamics, partition function, classical ideal gas in canonical ensemble theory, energy fluctuations, equipartition and virial theorems, a system of quantum harmonic oscillators as canonical ensemble, the grand canonical ensemble and significance of statistical quantities, classical ideal gas in grand canonical ensemble theory, density and energy fluctuations

UNIT--3

Quantum Statistics of Ideal Systems (12 Hrs.)

Quantum states and phase space, an ideal gas in quantum mechanical ensembles, statistics of occupation numbers; Ideal Bose systems: basic concepts and thermodynamic behavior of an ideal Bose gas, Bose-Einstein condensation, discussion of gas of photons (the radiation fields) and phonons (the Debye field); Ideal Fermi systems: thermodynamic behaviour of an ideal Fermi gas, discussion of heat capacity of a free-electron gas at low temperatures, Pauli paramagnetism.

UNIT- 4

Theory of Phase Transition (11 Hrs.)

First and Second order transition, diamagnetism, paramagnetism and ferromagnetism, dynamical model of phase transition, Ising model in the zeroth approximation, Diffusion equation, random walk and Brownian motion.

Recommended Books:

1. R.K. Pathria, 'Statistical Mechanics', 2nd Edn., Butterworth-Heinemann, Oxford.
2. K. Huang, 'Statistical Mechanics', Wiley Eastern, New Delhi.
3. B.K. Agarwal and M. Eisner, 'Statistical Mechanics', Wiley Eastern, New Delhi.
4. C. Kittel, 'Elementary Statistical Physics', Wiley, New York.
5. S.K. Sinha, 'Statistical Mechanics', Tata McGraw Hill, New Delhi.

MATHEMATICAL PHYSICS

Subject Code: MPHYS1-103

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

Linear Algebra and Vector space (11 Hrs.)

Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations. Rank of matrix, Gauss Jordan method to find inverse of matrix, reduction to normal form, Consistency and solution of linear algebraic equations, Eigenvalues and eigenvectors, Cayley-Hamilton theorem, Reduction to diagonal form, Contour Integration.

UNIT- 2

Integral Transform (12 Hrs.)

Fourier series of periodic functions, even and odd functions, half range expansions and Fourier series of different wave forms, Fourier transforms: Infinite and Finite Fourier transform (General, Sine, Cosine Fourier transform).

Laplace transforms of various standard functions, properties of Laplace transforms, inverse Laplace transforms and Solve Differential Equation using Inverse Laplace.

UNIT- 3

Partial Differential Equations (11 Hrs.)

Formation of PDE, Linear PDE, Homogeneous PDE with constant coefficients, Classification of PDE, Application of PDE: Wave equation and Heat conduction equation in one dimension. Two dimensional Laplace equation in Cartesian Coordinates, solution by the method of separation of variables, Gamma function, Beta function.

UNIT- 4

Special Functions (11 Hrs.)

Ordinary and Singular points, Power series solution of differential equations, Frobenius method. Bessel functions of first and second kind, Generating function, integral representation and recurrence relations for Bessel's functions of first kind, orthogonality. Legendre functions: generating function, recurrence relations and special properties, orthogonality.

Recommended Books:

1. Anil Makkar, 'Abstract Algebra', Sharma Publications.
2. M.D. Raisinghania, 'Advanced Differential Equation', S. Chand.
3. M.L. Boas, 'Mathematical Methods in the Physical Sciences', Wiley, New York.
4. E.D. Rainville, 'Special Functions', MacMillan, New York.
5. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers.

ELECTRONICS

Subject Code: MPHYS1-104

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

Electronic Devices (11 Hrs.)

Semiconductor Devices (diode, transistors), MESFETs and MOSFETs, Charge Coupled(CCDs) devices, Unijunction transistor (UJT), four layer (PNPN) devices, construction and working of PNP diode, Semiconductor controlled rectifier (SCR) and Thyristor, Transducers.

UNIT- 2

Electronic Circuits (11 Hrs.)

Multivibrators (Bistable Monostable and Astable), Differential amplifier, Operational amplifier (OP-AMP), OP-AMP as inverting and non-inverting, scalar, summer, integrator, differentiator. Schmitt trigger and logarithmic amplifier, Electronic analog computation circuits.

UNIT- 3

Digital Principles (11 Hrs.)

Binary and Hexadecimal number system, Binary arithmetic, Logic gates, Boolean equation of logic circuits, Karnaugh map simplifications for digital circuit analysis and design, Encoders & Decoders, Multiplexers and Demultiplexers, Parity generators and checkers, Adder-Subtractor circuits.

UNIT- 4

Sequential Circuits and Microprocessor (12 Hrs.)

Flip Flops, Registers, Up/Down counters, Basics of semiconductor memories: ROM, PROM, EPROM, and RAM, D/A conversion using binary weighted resistor network, Ladder, D/A converter, A/D converter using counter, Successive approximation A/D converter, Microprocessor INTEL 8085 basic.

Recommended Books:

1. Millman and Halkias, 'Electronic Devices and Circuits', Tata McGraw Hill, 1983.
2. Ben G. Streetman, 'Solid State Electronic Devices', Prentice Hall, New Delhi, 1995.
3. A.P. Malvino and D.P. Leach, 'Digital Principles and Applications', Tata McGraw Hill, New Delhi, 1986.
4. A.P. Malvino, 'Digital Computer Electronics', Tata McGraw Hill, New Delhi, 1986.
5. Millman, 'Microelectronics', Tata McGraw Hill, London, 1979.
6. W.H. Gothmann, 'Digital Electronics', Prentice Hall, New Delhi, 1980.

ELECTRONICS LAB.

Subject Code: MPHYS1-105

**L T P C
0 0 6 3**

Duration: 72 Hrs.

EXPERIMENTS

Note: Students will be required to perform at least ten experiments from the given list of experiments

1. Design of Regulated power supply and study of its characteristics.
2. To Study the various gates and verify their truth tables using IC's.
3. To study the Encoder and decoder circuits.
4. To study the INTEL 8085 Microprocessor and WAP to addition and subtraction of two 8 bit numbers.
5. WAP to addition and Subtraction of two 16 bit numbers.
6. WAP to multiply and divide of two 8 bit numbers.
7. To study the use of digital to analog and analog to digital converter.
8. Plot VI characteristics of depletion and enhancement type MOSFET.
9. Design 2:1 MUX circuit using basic gates and verify.
10. To study the construction of thyristor and plot VI characteristics of SCR.
11. Plot the frequency response of op-amp on semi-log graph paper.
12. Application of op-amp as inverting and non-inverting Amplifier.
13. To use the op-amp as summing, scaling and averaging amplifier.
14. Design differentiator and integrator using op-amplifier.

COMPUTER PROGRAMMING LAB.

Subject Code: MPHYS1-106

**L T P C
0 0 6 3**

Duration: 72 Hrs.

- Note:**
1. One Lab Class will be of 3 Hr duration in which theory concept will be cleared in 1 Hr and 2 Hr practice session to develop related program on PC.
 2. The final external examination will be Lab exam only.

Section A

BASIC THEORY INTRODUCTION FOR DOING NUMERICAL PROBLEMS

1. **Introduction to Numerical methods:** Computer algorithms, Interpolations – Lagrange,
 2. Newton divided difference, system of linear equations – Gauss elimination & Gauss Jordan method, Numerical differential equations by Euler method, modified Euler's method, Runge-Kutta method.
 3. **Programming with C++:** Introduction to the Concept of Object Oriented Programming; Advantages of C++ over conventional programming languages; Introduction to Classes, Objects: C++ programming syntax for Input/Output, Operators, Loops, Decisions, simple and inline functions, arrays, strings, pointers; some basic ideas about memory management in C++.
- OR
4. **Programming with Fortran 77:** Computer hardware, software, programming languages, Fortran 77, classification of data, variables, dimension and data statement, input/output, format, branching, IF statements, DO statements, subprograms, operations with files.

Section B

LIST OF NUMERICAL PROBLEMS

Note: Students will be required to perform at least ten experiments from the below given list of programmes/ experiments.

EXPERIMENTS

1. Arithmetic operations of integers, mensuration (area of circle, rectangle).

2. Data handling: find standard deviation, mean, variance, moments etc. of at least 25 entries.
3. Choose a set of 10 values and find the least squared fitted values.
4. Implementation of Newton's divided difference formula to find tabulated values.
5. To calculate solution of system of linear equations by Gauss elimination OR Gauss Jordan method.
6. To evaluate the integrals by using Simpson methods.
7. To find differential equation using modified Euler method.
8. To compute the solution of ordinary differential equation by using Euler's method.

OR

Study the charging and discharging of a capacitor in RC circuit with a DC source using Euler method. Graphically demonstrate the variation of charge with time for two values of time step size.

9. To compute the solution of ordinary differential equation by using Runge-Kutta method.

OR

Study the growth and decay of current in RL circuit containing (a) DC source and (b) AC source using Runge-Kutta method. Draw graphs between current and time in each case. Perform power analysis in the circuit for two values of time step for the case.

10. Generation of waves on superposition like stationary waves and beats.
11. Fourier analysis of square waves.
12. Wave packet and uncertainty principle.
13. Modify the program to include AC source instead of D.C. Source.
14. Study graphically the path of a projectile with and without air drag, using FN method. Find the horizontal range and maximum height in either case. Write your comments on the findings.
15. Motion of artificial satellite.
16. Study of motion of a one-dimensional harmonic-oscillator without and with damping effect (use Euler method). Draw graphs showing the relations (a) velocity vs time (b) acceleration vs time (c) position vs time.

Recommended Books

1. J.B. Scarborough, 'Numerical Mathematical Analysis', 4th Edn., Oxford Book Co.
2. P.L. DeVries, 'A First Course in Computational Physics', 2nd Edn., Wiley, 2011.
3. S. Chandra, 'Computer Applications in Physics', 2nd Edn., Narosa, 2008.
4. R.C. Verma, P.K. Ahluwalia and K.C. Sharma, 'Computational Physics', 1st Edn., New Age, 2005.
5. 'Object Oriented Programming with C++: Balagurusamy', 2nd Edn., Tata McGraw Hill, 2002.

QUANTUM MECHANICS –I

Subject Code: MPHYS1-207

L T P C
4 0 0 4

Duration: 45 Hrs.

UNIT- 1

Basic Formulation and Quantum Kinematics (12 Hrs.)

Stern Gerlach experiment as a tool to introduce quantum ideas, analogy of two level quantum system with polarisation states of light. Complex linear vector spaces, ket space, bra space and inner product, operators and properties of operators. Eigen kets of an observable, Eigen kets as base kets, matrix representations. Measurement of observable, compatible vs. incompatible observable, commutators and uncertainty relations. Change of basis and Unitary transformations. Diagonalization of operators.

UNIT- 2

Quantum Dynamics (11 Hrs.)

Time evolution operator and Schrodinger equation, Schrodinger vs. Heisenberg picture, Unitary operator, state kets and observable in Schrodinger and Heisenberg pictures, Heisenberg equations of motion, Ehrenfest's theorem.

UNIT- 3

One Dimensional Systems (10 Hrs.)

Potential Step, potential barrier, potential well. Scattering vs. Bound states. Simple harmonic oscillator, energy Eigen states, wave functions and coherent states.

UNIT- 4

Theory of Angular Momentum (12 Hrs.)

Orbital angular momentum commutation relations. Eigen value problem for L^2 , Angular momentum algebra, commutation relations. Introduction to the concept of representation of the commutation relations in different dimensions. Eigen vectors and Eigen functions of J^2 and J_z . Addition of angular momentum and C.G. coefficients.

Recommended Books

1. J.J. Sakurai, 'Modern Quantum Mechanics', Pearson Education Pvt. Ltd., New Delhi, 2002.
2. L.I. Schiff, 'Quantum Mechanics', Tokyo McGraw Hill, 1968.
3. 'Feynmann Lectures in Physics', Vol. III, Addison Wesley, 1975.
4. Powel and Craseman, 'Quantum Mechanics', Narosa Pub., New Delhi, 1961.
5. Merzbacher, 'Quantum Mechanics', John Wiley & Sons, New York, 1970.

ELECTRODYNAMICS-1

Subject Code: MPHYS1-208

L T P C

Duration: 45 Hrs.

4 0 0 4

UNIT- 1

Electrostatics (12 Hrs.)

Review of basic concepts of Electrostatics (Coulomb's law, Gauss's law, Poisson's equation, Laplace equation), Solution of boundary value problem: Green's function, method of images and calculation of Green's function for the image charge problem in the case of a sphere, Laplace equation, uniqueness theorem. Electrostatics of dielectric media, multipole expansion, Boundary value problems in dielectrics; molecular polarizability, electrostatic energy in dielectric media.

UNIT- 2

Magnetostatics (11 Hrs.)

Review of basic concept of Magnetostatics and Electromagnetic induction (Biot and Savart's law, Ampere's law, Gauss law, Faraday's Law) vector potential and magnetic field of a localized current distribution. Magnetic moment, force and torque on a magnetic dipole in an external field. Magnetic materials, Magnetization and microscopic equations. Boundary Conditions for the field vectors B, H.

UNIT- 3

Time-varying fields (11 Hrs.)

Physical Significance of Maxwell's equations, vector and scalar potential, Gauge transformations; Lorentz gauge and Coulomb gauge. Poynting theorem. conservation laws for a system of charged particles and electromagnetic field, continuity equation

UNIT- 4

Electromagnetic Waves (11 Hrs.)

Plane wave like solutions of the Maxwell equations. Polarisation, linear and circular polarisation. Superposition of waves in one dimension. Group velocity. Reflection and

refraction of electromagnetic waves at a plane surface between dielectrics. Polarisation by reflection and total internal reflection. Fresnel Law, Waves in conductive medium.

Recommended Books:

1. J.D. Jackson, 'Classical Electrodynamics', John & Wiley Sons Pvt. Ltd. New York, 2004.
2. D.J. Griffiths; Introduction to Electrodynamics; Pearson Education Ltd., New Delhi, 1991.
3. J.B. Marion; Classical Electromagnetic Radiation; Academic Press, New Delhi, 1995.
4. M.N.O. Sadiku, 'Elements of Electromagnetics', Oxford University Publication, 2014.
5. A. Pramanik, 'Electromagnetism - Theory and Applications', PHI Learning Pvt. Ltd, New Delhi, 2009.
6. W.J. Duffin, 'Electricity and Magnetism', McGraw Hill Publication, 1980.

ATOMIC AND MOLECULAR PHYSICS

Subject Code: MPHYS1-209

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

One Electron Atom (12 Hrs.)

Vector model of a one electron atom, Quantum states of an electron in an atom, Hydrogen atom spectrum, Spin-orbit Coupling, Relativistic correction, Hydrogen fine structure, Spectroscopic terms, Hyperfine structure.

UNIT- 2

Two valance Electron Atom (10 Hrs.)

LS coupling, Pauli exclusion principle, Interaction energy for LS coupling, Lande interval rule, jj coupling, interaction energy for jj coupling.

UNIT- 3

Atom in Magnetic and Electric Field (10 Hrs.)

Zeeman effect, Magnetic moment of a bound electron, Magnetic interaction energy in weak field. Paschen-Back effect, Magnetic interaction energy in strong field. Stark effect, First order Stark effect in hydrogen.

UNIT- 4

Molecular Spectroscopy (13 Hrs.)

Rotational and vibrational spectra of diatomic molecule, Raman Spectra, Electronic spectra, Born-Oppenheimer approximation, Vibrational coarse structure, Franck-Condon principle, Rotational fine structure of electronic-vibration transitions. Spin Resonance Spectroscopy: Electron spins resonance and nuclear magnetic resonance spectroscopy.

Recommended Books:

1. H.E. White, 'Introduction to Atomic Spectra', 5th Edn., McGraw Hill, 1934,
2. C.N. Banwell and E.M. McCash, 'Fundamentals of Molecular Spectroscopy', 4th Edn., Tata McGraw Hill, 1994.
3. R. Kumar, 'Atomic and Molecular Spectra: Laser', Kedar Nath Ram Nath Publication.

CONDENSED MATTER PHYSICS-I

Subject Code: MPHYS1-210

**L T P C
4 0 0 4**

Duration: 48 Hrs.

UNIT- 1

Crystallography and Defects in Solids (15 Hrs.)

Crystal structure, Bravais lattices and its classification, Miller Indices, X-Ray Diffraction, Braggs law of Crystallography, Braggs spectrometer, Ordered Phase of matter: kinds of liquid crystalline order, Quasi Crystals.

Defects: Point defects, Impurities, Vacancies- Schottky and Frankel vacancies, Color centres and coloration of crystals, F-centres, Line defects (dislocations), Edge and screw dislocations, Berger Vector, Planar (stacking) Faults, Grain boundaries.

UNIT- 2

Lattice Dynamics and Phonons (10 Hrs.)

Concept of photons and phonons, Quantization of lattice vibrations, Energy and momentum of phonons, inelastic scattering of photons by phonons, Dispersion relation for lattice waves in monoatomic linear lattice, Vibration modes of diatomic linear lattice.

UNIT- 3

Specific Heat for Solid (11 Hrs.)

Molar Specific heat at constant pressure and volume, Dulong Petit's Law, Einstein Model of specific heat-low and high temperature, Failure of Dulong Petit's Law at low temperature, Drawback of Einstein model, Debye model of specific heat and its comparison with Einstein model, Debye T^3 law, Drude Model of Electrical and Thermal Conductivity.

UNIT- 4

Diffusion Phenomenon in Solids (9 Hrs.)

Diffusion in solids, Classification of diffusion process, Mechanism of atomic diffusion, Fick's law, Factor affecting diffusion and applications, Kirkendal law.

Recommended Books:

1. C. Kittel, 'Introduction to Solid State Physics'.
2. N.W. Ashcroft and N.D. Mermin, 'Solid State Physics'.
3. J.M. Ziman, 'Principles of the Theory of Solids'.
4. A.J. Dekker, 'Solid State Physics'.
5. G. Burns, 'Solid State Physics'.
6. M.P. Marder, 'Condensed Matter Physics'.
7. B.D. Cullity, 'Elements of X-Ray Diffraction'.
8. L.V. Azaroff, 'Introduction to Solids'.

ADVANCED OPTICS AND SPECTROSCOPY LAB.

Subject Code: MPHYS1-211

L T P C

Duration: 72 Hrs.

0 0 6 3

Note: Students will be required to perform at least ten experiments from the given list of experiments.

1. To find the wavelength of monochromatic light using Feby Perot interferometer.
2. To find the wavelength of sodium light using Michelson interferometer.
3. To calibrate the constant deviation spectrometer with white light and to find the wavelength of unknown monochromatic light.
4. To find the grating element of the given grating using He-Ne laser light.
5. To find the wavelength of He-Ne laser.
6. To verify the existence of Bohr's energy levels with Frank-Hertz experiment.
7. To determine the charge to mass ratio (e/m) of an electron with normal Zeeman Effect.
8. To determine the velocity of ultrasonic waves in a liquid using ultrasonic interferometer.
9. Laboratory spectroscopy of standard lamps.
10. To study the Kerr effect using Nitrobenzene.
11. To study polarization by reflection - Determination of Brewster's angle.
12. To measure numerical aperture and propagation loss and bending losses for optical fibre as function of bending angle and at various wavelengths.
13. To study the Magnetorestriction effect using Michelson interferometer.
14. Experiments with microwave (Gunn diode): Young's double slit experiment, Michelson interferometer, Feby-Perot interferometer, Brewster angle, Bragg's law, refractive index of a prism.

15. To measure (i) dielectric constant of solid/liquid; (ii) Q of a cavity. Use of Klystron-based microwave generator.

CONDENSED MATTER LAB.

Subject Code: MPHYS1-212

**L T P C
0 0 6 3**

Duration: 72 Hrs.

Note: Students will be required to perform at least ten experiments from the given list of experiments:

EXPERIMENTS

1. To study the characteristics of a LED and determine activation energy.
2. To study magneto-resistance and its field dependence.
3. To trace hysteresis loop and calculate retentivity, coercivity and saturation magnetization
4. To prepare the thin films of ferroelectric material/ composite films in laboratory by using solvent cast and spin cast method.
5. To prepare electrical contacts on thin films through vacuum/sputtering technique.
6. To study dielectric permittivity of different polymer/ composites as a function of frequency.
7. To study dielectric losses (Tan Delta) spectra of different polymer/ composites as a function of frequency.
8. To study the temperature dependence of dielectric losses (Tan Delta) of different polymer/ composites at different frequencies.
9. To study of ferro-electricity in a ferroelectric material/ composite film
10. To study the dielectric behavior of PZT ceramic by determining Curie temperature, dielectric strength & dielectric constant.
11. Determination of crystal structure & lattice parameters using X-rays diffraction technique.
12. Sizing nano-structures (UV-VIS spectroscopy).
13. DSC/DTA/TGA studies for thermal analysis of materials.

SEMINAR-I

Subject Code: MPHYS1-213

**L T P C
0 0 2 1**

Duration: 24 Hrs.

Guidelines for the Seminar I (MPHY1-213) for 2nd Semester

1. In the beginning of the semester, a teacher will be allocated maximum 30 students. The latter will guide/teach them how to prepare/present 15 minutes Power Point Presentation for the Seminar.
2. If there are more than 30 students in the class, then class will be divided into two groups having equal students. Each group may be allocated to a different teacher.
3. Each student will be allotted a topic by the teacher at least one week in advance for the presentation. The topic for presentation may be from the syllabus or relevant to the syllabus of the program.
4. During the presentation being given by a student, all the other students of his/her group will attend the Seminar. The assessment/evaluation will be done by the teacher. However, Head of Department and other faculty members may also attend the Seminar, ask questions and give their suggestions.
5. This is a turn wise continuous process during the semester and a student will give minimum two presentations in a Semester.
6. For the evaluation, the following criteria will be adopted,
 - (a) Attendance in Seminar: 25 Marks
 - (b) Knowledge of Subject along with Q/A handling during the Seminar: 25 Marks

(c) Presentation and Communication Skills: 25 Marks

(d) Contents of the Presentation: 25 Marks.

NUCLEAR PHYSICS

Subject Code: MPhys1-314

L T P C
4 0 0 4

Duration: 45 Hrs.

UNIT- 1

Nuclear Interactions (12 Hrs.)

Two nuclear system, deuteron problem, binding energy, nuclear potential well, pp and pn scattering experiments at low energy, Nucleon- nucleon interaction, Exchange forces and tensor forces, meson theory of nuclear forces, Nucleon- nucleon scattering, Effective range theory, Spin dependence of nuclear forces, independence and charge symmetry of nuclear forces, Yukawa interaction.

UNIT- 2

Nuclear Reactions (10 Hrs.)

Direct and compound nuclear reaction mechanisms, Cross section in terms of partial wave amplitude, Compound nucleus, Scattering matrix, Reciprocity theorem, Breit-Wigner one-level formula-Resonance Scattering.

UNIT- 3

Nuclear Methods (11 Hrs.)

Liquid Drop Model-Bohr-Wheeler theory of fission- Experimental evidence for shell effects- Shell Model- spin- Orbit Coupling-Magic Numbers-Angular momenta and parities of nuclear ground states- Qualitative discussion and estimates of transition rates- Magnetic moments and Schmidt lines- Collective model of Bohr and Mottleson.

UNIT- 4

Nuclear Decay (12 Hrs.)

Beta decay, Fermi theory of beta decay, Shape of beta spectrum, Total decay rate, Angular momentum and parity selection rules, Comparative half-lives, Allowed and forbidden transitions, Two component theory of neutrino decay, Detection and properties of neutrino, Gamma decay, Multiple transitions in nuclei, Angular momentum and parity selection rules, Internal conversion, Nuclear isomerism.

Recommended Books:

1. R.R. Roy & B.P. Nigam, 'Nuclear Physics', New Age International Ltd., 2001.
2. M.A. Preston and R.K. Bhaduri, 'Structure of Nucleus', Addison-Welsey, 2000.
3. M.K. Pal, 'Theory of Nuclear Structure', East-West Press, Delhi, 1983.
4. 'Kaplan Irving Nuclear Physics', Narosa Publishing House, 2000.
5. D.C. Tayal, 'Nuclear Physics', Himalaya Publication Home, 2007.
6. A. Bohr and B.R. Mottelson, 'Nuclear Structure', Vol.-1 (1969) and Vol.-2 Benjamin, Reading, A.1975.
7. Kenneth S. Krane, 'Introductory Nuclear Physics', Wiley, New York, 1988.
8. G.N. Ghoshal, 'Atomic and Nuclear Physics', Vol.-2, S. Chand and Co., 1997.

QUANTUM MECHANICS-II

Subject Code: MPhys1-315

L T P C
4 0 0 4

Duration: 45 Hrs.

UNIT- 1

Identical Particles (10 Hrs.)

Brief introduction to identical particles in quantum mechanics, symmetrisation postulates-symmetric and antisymmetric wave functions, Particle exchange operator, Pauli Exclusion

Principle, Spin statistic Connections-Bose Einstein and Fermi Dirac Statistics, Application to 2-electron systems.

UNIT-2

Time-independent and dependent Approximation Methods (12 Hrs.)

Non-degenerate perturbation theory & its applications, degenerate case, variational methods, WKB approximation. Time-dependent perturbation theory, transition probability calculations, Fermi-golden rule, adiabatic approximation, sudden approximation.

UNIT- 3

Scattering Theory (12 Hrs.)

Partial wave analysis, Diffraction and Scattering Cross-sections, Determination of phase shift, Optical theorem. Born approximation, extend to higher orders. Validity of Born approximation.

UNIT- 4

Relativistic Quantum Mechanics (11 Hrs.)

Klein Gordon equation. Dirac Equation, Lorentz covariance of Dirac equation. Positive and negative energy solutions of Dirac equation, positrons. Properties of gamma matrices. Parity operator and its action on states. Semi-classical theory of radiation.

Recommended Books:

1. J.J. Sakurai, 'Modern Quantum Mechanics', Pearson Education Pvt. Ltd., New Delhi, 2002.
2. L.I. Schiff, 'Quantum Mechanics', Tokyo McGraw Hill, 1968.
3. 'Feynmann Lectures in Physics', Vol. III, Addison Wesley, 1975.
4. Powel and Craseman, 'Quantum Mechanics', Narosa Pub., New Delhi, 1961.
5. Merzbacher, 'Quantum Mechanics'. John Wiley & Sons, New York, 1970.

CONDENSED MATTER PHYSICS-II

Subject Code: MPHYS1-316

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

Theory of Magnetic Materials (12 Hrs.)

Classification of magnetic materials, the origin of permanent magnetic dipoles, diamagnetic susceptibility, classical and quantum theory of paramagnetism, Quenching of orbital angular momentum, Paramagnetic susceptibility of conduction electrons, Ferro magnetism, Weiss molecular theory, Ferromagnetic domains, super exchange interaction, the structure of ferrites, saturation magnetisation, Neel's theory of ferrimagnetism, Curie temperature and susceptibility of ferrimagnets.

UNIT- 2

Superconductivity (12 Hrs.)

Superconductivity, Superconductors as ideal diamagnetic materials, Signatures of Superconducting state, Meissner Effect, Type I & II superconductors, London Equations, London penetration depth, Isotope effect, BCS Theory of superconductivity, Josephson Effect (DC & AC), Applications of Superconductors.

UNIT- 3

Dielectric Properties and Ferro Electrics (11 Hrs.)

Macroscopic field, local field, Lorentz field, Clausius-Mossotti relations, Different contribution to polarization: dipolar, electronic and ionic polarizabilities, Response and Relaxation Phenomenon, General properties of ferroelectric materials, dipole theory of ferroelectricity, Ferroelectric Domains, thermodynamics of ferroelectric transitions.

UNIT- 4

Free Electrons Theory of Metal (10 Hrs.)

Difficulties of the classical theory, the free electron model, The Fermi-Dirac distribution, electronic specific heat, Paramagnetism of free electrons, Thermionic emission from metals, energy distribution of the emitted electrons, Field-enhanced electron emission from metals, Changes of work function due to adsorbed atoms, contact potential between two metals, photoelectric effect of metals.

Recommended Books:

1. C. Kittel, 'Introduction to Solid State Physics'.
2. N.W. Ashcroft and N.D. Mermin, 'Solid State Physics'.
3. J.M. Ziman, 'Principles of the Theory of Solids'.
4. A.J. Dekker, 'Solid State Physics'.
5. G. Burns, 'Solid State Physics'.
6. M.P. Marder, 'Condensed Matter Physics'.
7. B.D. Cullity, 'Elements of X-Ray Diffraction'.
8. L.V. Azaroff, 'Introduction to Solids'.

NUCLEAR PHYSICS LAB.

Subject Code: MPHYS1-317

**L T P C
0 0 6 3**

Duration: 72 Hrs.

Note: Students will be required to perform at least ten experiments from the given list of experiments:

EXPERIMENTS

1. Analysis of pulse height of gamma ray spectra.
2. To study absorption of beta rays in Al and deduce end-point energy of a beta emitter.
3. To study the dead time and other characteristics of G.M. counter.
4. To study Gaussian distribution and Source strength of a beta-source using G.M. counter.
5. Recording and calibrating a gamma ray spectrum by scintillation counter.
6. Detecting gamma radiation with a scintillation counter.
7. Identifying and determining the activity of weakly radioactive samples.
8. To calibrate the given gamma-ray spectrometer and determine its energy resolution.
9. Energy resolution and calibration of a gamma-ray spectrometer using multi-channel analyzer.
10. Time resolution and calibration of a coincidence set-up using a multi- channel analyzer.
11. Formation and Counting of alpha particle tracks on Solid State Nuclear Track
12. Detectors using Optical Microscope/ spark counter.
13. Determination of Ionization Potential of Lithium.
14. Determination of Lande's factor of DPPH using Electron-Spin resonance (E.S.R.) Spectrometer.

SEMINAR-II

Subject Code: MPHYS1-318

**L T P C
0 0 2 1**

Duration: 24 Hrs.

Guidelines for the Seminar II (MPHY1-318) for 3rd Semester

1. In the beginning of the semester, a teacher will be allocated maximum 30 students. The latter will guide/teach them how to prepare/present 15 minutes Power Point Presentation for the Seminar.
2. If there are more than 30 students in the class, then class will be divided into two groups having equal students. Each group may be allocated to a different teacher.

3. Each student will be allotted a topic by the teacher at least one week in advance for the presentation. The topic for presentation may be from the syllabus or relevant to the syllabus of the program.
4. During the presentation being given by a student, all the other students of his/her group will attend the Seminar. The assessment/evaluation will be done by the teacher. However, Head of Department and other faculty members may also attend the Seminar, ask questions and give their suggestions.
5. This is a turn wise continuous process during the semester and a student will give minimum two presentations in a Semester.
6. For the evaluation, the following criteria will be adopted,
 - a) Attendance in Seminar: 25 Marks
 - b) Knowledge of Subject along with Q/A handling during the Seminar: 25 Marks
 - c) Presentation and Communication Skills: 25 Marks
 - d) Contents of the Presentation: 25 Marks.

ADVANCED MATHEMATICAL PHYSICS

Subject Code: MPHYS1-356

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

Complex Analysis (12 Hrs.)

Limits, Continuity and Derivative of the function of Complex variable, Analytic Function, Cauchy- Riemann Equations, Harmonic Function, Orthogonal System, Conjugate Function, Taylor and Laurent series, Complex integration: Line Integral, Singularities, Cauchy integration Theorem, Cauchy's Integral formula, residues and evaluation of integrals, Contour Integration.

UNIT- 2

Group Theory (12 Hrs.)

Definition of a group, Composition table, Conjugate elements and classes of groups, direct product, Isomorphism, homeomorphism, permutation group, Definitions of the three dimensional rotation group and SU(2), O(3).

UNIT- 3

Sampling and Probability Distribution (12 Hrs.)

Random Variables: Definition, Probability Distribution-Binomial, Poisson and Normal distributions. Sampling Distributions: Population and samples, Concept of sampling Distributions-Student's t test, F-test and Chi-square test, Curve Fitting, Least square fitting.

UNIT- 4

Tensors (12 Hrs.)

Review of tensor, Equality of Tensors - Symmetric and Skew – symmetric tensors - Outer multiplication, Contraction and Inner Multiplication - Quotient Law of Tensors - Reciprocal Tensor of Tensor - Relative Tensor - Cross Product of Vectors, Riemannian Space - Christoffel Symbols and their properties.

Recommended Books:

1. J.N. Sharma, 'Complex Analysis', Krishna Publishers.
2. S.C. Gupta & V.K. Kapoor, 'Mathematical Statistics', S. Chand.
3. Josaph A. Gallian, 'Contemporary Abstract Algebra', Narosa.
4. A.R. Vasishtha, 'Modern Algebra', Krishna Prakashan.
5. Erwin Kreyszig, 'Advanced Mathematical Physics'.
6. J.L. Synge and A. Schild, 'Tensor Calculus', Toronto, 1949.

SCIENCE OF RENEWABLE ENERGY SOURCES**Subject Code: MPHYS1-357****L T P C
4 0 0 4****Duration: 45 Hrs.****UNIT- 1****Introduction (6 Hrs.)**

Production and reserves of energy sources in the world and in India, need for alternatives, renewable energy sources.

UNIT- 2**Energy (15 Hrs.)**

Thermal applications, solar radiation outside the earth's atmosphere and at the earth's surface, fundamentals of photovoltaic energy conversion. Direct and indirect transition semi-conductors, interrelationship between absorption coefficients and band gap recombination of carriers.

Types of solar cells, p-n junction solar cell, Transport equation, current density, open circuit voltage and short circuit current, description and principle of working of single crystal, polycrystalline and amorphous silicon solar cells, conversion efficiency. Elementary ideas of Tandem solar cells, solid-liquid junction solar cells and semiconductor-electrolyte junction solar cells. Principles of photoelectrochemical solar cells. Applications.

UNIT- 3**Hydrogen Energy (14 Hrs.)**

Environmental considerations, solar hydrogen through photo electrolysis and photocatalytic process, physics of material characteristics for production of solar hydrogen. Storage processes, solid state hydrogen storage materials, structural and electronic properties of storage materials, new storage modes, safety factors, use of hydrogen as fuel; use in vehicles and electric generation, fuel cells, hydride batteries.

UNIT- 4**Other Sources (10 Hrs.)**

Nature of wind, classification and descriptions of wind machines, power coefficient, energy in the wind, wave energy, ocean thermal energy conversion (OTEC), system designs for OTEC.

Recommended Books:

1. S.P. Sukhatme, 'Solar Energy', Tata McGraw Hill, New Delhi, 2008.
2. Fonash, 'Solar Cell Devices', Academic Press, New York, 2010.
3. Fahrenbruch and Bube, 'Fundamentals of Solar Cells, Photovoltaic Solar Energy', Springer, Berlin, 1983.
4. Chandra, 'Photoelectrochemical Solar Cells', New Age, New Delhi.

FIBRE OPTICS AND LASER TECHNOLOGY**Subject Code: MPHYS1-358****L T P C
4 0 0 4****Duration: 45 Hrs.****UNIT- I****Fibre Optics (12 Hrs.)**

Optical fibre and its properties: Introduction, basic fibre construction, propagation of light, modes and the fibre, refractive index profile, types of fibre, dispersion, data rate and band width, attenuation, leaky modes, bending losses, cut-off wavelength, mode field diameter, other fibre types, Fibre fabrication and cable design: Fibre fabrication, mass production of fibre, comparison of the processes, fibre drawing process, coatings, cable design requirements, typical cable design, testing.

UNIT- II

Basics of Lasers (12 Hrs.)

Population Inversion, Einstein Coefficients and Light Amplification, Laser Rate Equations; Two-level, Three-level, and Four-level Laser Systems, Optical Resonators, Axial and Transverse Modes, Q-switching and Mode Locking in Lasers, Coherence Properties of Laser Light, Temporal Coherence, Monochromaticity, Spatial Coherence, Directionality, Linewidth, Brightness, Focusing Properties of Laser Radiation & Tunability.

UNIT- III

Types of Lasers (10 Hrs.)

Doped-insulator Lasers: Ruby Laser, Nd: YAG and Nd: Glass Laser; Gas Lasers: Atomic Lasers – He Ne Laser, Ion Lasers: Argon Laser, Molecular Lasers: Carbon Dioxide Laser, Nitrogen Laser, and Excimer Laser; Liquid Dye Laser; Semiconductor Laser.

UNIT- IV

Applications of Lasers (11 Hrs.)

Measurement of distance – Interferometric methods, Beam modulation telemetry, Pulse echo techniques; Laser Tracking, LIDAR, Holography, Applications of Holography: Holographic Interferometry – Double Exposure, Real Time, and Time Average; Laser Cooling, Material Processing -Lasers in Welding, Drilling, and Cutting, Medicine, Laser-induced Fusion, Resistor Trimming, Laser Soldering, Laser Heat Treatment; Information Storage, Bar Code Scanner.

Recommended Books:

1. Wymer and Meardon, 'The Elements of Fibre Optics', S.L. Regents/Prentice Hall, 1993.
2. K. Thyagarajan and A.K. Ghatak, 'Lasers Theory and Applications', Macmillan India Ltd., 1995.
3. Ajoy Ghatak and K. Thyagarajan, 'Fiber Optics and Lasers', Macmillan India Limited, 2006.
4. B.B. Laud, 'Laser and Non Linear Optics', New Age International Publisher, 2011.
5. M. N. Avadhanui and P. S. Hemne, 'An Introduction to Laser: Theory and Applications', S. Chand & Company Ltd.

MICROPROCESSOR

Subject Code: MPHYS1-359

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

Introduction (10 Hrs.)

Introduction to Microprocessor, General Architecture of Microcomputer System, Microprocessor UNIT-s, Input UNIT-, Output UNIT-, Memory UNIT- and auxiliary storage Unit.

UNIT- II

Architecture of 8086/8088 Microprocessor (11 Hrs.)

Description of various pins, configuring the 8086/8088 microprocessor for minimum and maximum mode systems, internal architecture of the 8086/8088 microprocessor, system clock, Bus cycle, Instruction execution sequence.

UNIT- III

Memory Interface of 8086/8088 Microprocessor (11 Hrs.)

Address space and data organization, generating memory addresses hardware organization of memory address space, memory bus status code, memory control signals, read/write bus cycles, program and data storage memory, dynamic RAM system.

UNIT- IV

Input/output Interface of the 8086/8088 Microprocessor (13 Hrs.)

I/O interface, I/O address space and data transfer, I/O instructions, I/O bus cycles, Output ports, 8255A Programmable Peripheral, Interface (PPI), Serial communication interface (USART and UART) – the RS- 232 C interface. Interface of 8086/8088 Microprocessor, Types of Interrupt, Interrupt Vector Table (IVT).

Recommended Books:

1. Walter Triebel, 'The 8086 Microprocessor – Architecture, Software and Interfacing Techniques', PHI, Delhi.
2. Douglas V. Hall, 'Microprocessors and Interfacing – Programming and Hardware', Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. Peter Abel, 'IBM PC Assembly Language and Programming', PHI, Delhi.

PARTICLE PHYSICS

Subject Code: MPHYS1-419

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

Elementary Particles and Their Properties (11 Hrs.)

Historical survey of elementary particles and their classification, determination of mass, life time, decay mode, spin and parity of muons, pions, kaons and hyperons. Experimental evidence for two types of neutrinos, production and detection of some important resonances and antiparticles.

UNIT- 2

Symmetries and Conservation Laws (12 Hrs.)

Conserved quantities and symmetries, the electric charge, baryon number, leptons and muon number, particles and antiparticles, hypercharge (strangeness), the nucleon isospin, isospin invariance, isospin of particles, parity operation, charge conservation, time reversal invariance, Elementary ideas of CP and CPT invariance, UNIT-ary symmetry SU(2), SU (3) and the quark model.

UNIT- 3

Weak Interaction (11 Hrs.)

Classification of weak interactions, Fermi theory of beta decay, matrix element, classical experimental tests of Fermi theory, Parity non conservation in beta decay, Weak decays of strange-particles and Cabibbo's theory.

UNIT- 4

Gauge Theory and GUT (11 Hrs.)

Gauge symmetry, field equations for scalar (spin 0), spinor (spin $\frac{1}{2}$), vector (spin-1) and fields, global gauge invariance, local gauge invariance, Feynmann rules, introduction of neutral currents. Spontaneously broken symmetries in the field theory, standard model.

Recommended Books:

1. H. Fraunfelder and E.M. Henley, 'Subatomic Physics', N.J. Prentice Hall.
2. D. Griffiths, 'Introduction to Elementary Particles', Wiley-VCH, 2008.
3. D.H. Perkins, 'Introduction to High Energy Physics', Cambridge University Press, 2000.
4. I.S. Hughes, 'Elementary Particles', Cambridge University Press, Cambridge, 1996.
5. F.E. Close, 'Introduction to Quarks and Partons', Academic Press, London, 1981.
6. M.P. Khanna, 'Introduction to Particle Physics', Prentice Hall of India, New Delhi, 2004.

ELECTRODYNAMICS-II**Subject Code: MPHYS1-420****L T P C
4 0 0 4****Duration: 45 Hrs.****UNIT- 1****Electromagnetic Wave Guides (11 Hrs.)**

Field at the surface of and within a conductor, EM wave guides, Cylindrical cavities and waveguides, transverse electric, transverse magnetic and transverse electric and magnetic modes in waveguides, Rectangular wave guides, energy flow and attenuation in wave guides, cavity resonators, power loss in cavity and quality factor.

UNIT- 2**Relativistic Formulation of Electrodynamics (12 Hrs.)**

Postulate of Special theory of relativity, Review of Lorentz's transformations for length contraction and time dilation, Structure of space-time, four scalars, four vectors and tensors, Relativistic electrodynamics, Magnetism as a relativistic phenomenon and field transformations, Recasting Maxwell equations in the language of special relativity, covariance and manifest covariance, field tensor. Lagrangian formulation for the covariant Maxwell equations.

UNIT- 3**Radiating Systems (10 Hrs.)**

Fields of radiation of localized oscillating sources, electric dipole fields and radiation, magnetic dipole and electric quadrupole fields, central fed antenna, brief introduction to radiation damping and radiation reaction.

UNIT- 4**Charged Particle Dynamics (12 Hrs.)**

Fields of Moving Charges: Lienard Wiechert potential, field of a moving charge. Non-relativistic motion in uniform constant fields: Constant uniform electric field, Constant uniform magnetic field, Crossed uniform and constant electric and magnetic fields. Non-relativistic motion of a charged particle in a slowly varying magnetic field. Relativistic motion of a charged particle: Constant magnetic field, Constant electric field Electromagnetic Field of a plane wave. Radiated power from an accelerated charge at low velocities, Larmor's power formula and its relativistic generalization; Angular distribution of radiation emitted by an accelerated charge.

Recommended Books:

1. J.D. Jackson, 'Classical Electrodynamics', John & Wiley Sons Pvt. Ltd. New York, 2004.
2. D.J. Griffiths, 'Introduction to Electrodynamics', Pearson Education Ltd., New Delhi, 1991.
3. J.B. Marion, 'Classical Electromagnetic Radiation', Academic Press, New Delhi, 1995.
4. W.J. Duffin, 'Advanced Electricity and Magnetism', McGraw Hill Publication, 1968.
5. R.K. Shevgaonker, 'Electromagnetic Waves', McGraw Hill Publication, 2005.
6. D.K. Chen, 'Field and Wave Electromagnetics', Addison-Wesley, 1989.
7. M.N.O. Sadiku, 'Elements of Electromagnetics', Oxford University Publication, 2014.

ADVANCED PHYSICS LAB.**Subject Code: MPHYS1-421****L T P C
0 0 6 3****Duration: 72 Hrs.**

Note: Students will be required to perform at least ten experiments from the given list of experiments.

Nuclear Physics Experiments

1. To study p-p interaction and find the cross-section of a reaction using a bubble chamber film.

2. To study n-p interaction and find the cross-section using a bubble chamber film.
3. To study k-d interaction and find its multiplicity and moments using a bubble chamber film.
4. To study a $\pi\mu$ event using emulsion track film.
5. To study the energy resolution of Cs-137.
6. To identify the unknown γ -source using energy calibration.
7. To study the alpha spectrum from natural sources Th and U.
8. To study calibration of a beta-ray spectrometer.
9. To study scattering of gamma rays from different elements.
10. To determine range of Alpha/Beta-particles in air at energy loss in thin foils.
11. To determine strength of alpha particles using SSNTD.

Computational Physics Experiments

Programming software: Fortran/C++/Monte Carlo Method.

12. Obtain the energy eigen values of a quantum oscillator using Runge-Kutta method.
13. Study the motion of a charged particle in (a) uniform electric field (b) in uniform magnetic field (c) in combined electric and magnetic fields (cyclotron). Draw graphs in each case.
14. Monte-Carlo technique to simulate phenomenon of nuclear radioactivity. Modify your program to a case when daughter nucleus is also unstable.
15. Study the motion of two coupled harmonic oscillators. Compare the numerical results with analytic results.
16. To calculate the Radioactivity and disintegration rate of a given radioisotopes.
17. To calculate the half and mean life of radioactive isotopes.
18. To calculate the absorbed dose and Radiation Exposure for a given situation.
19. Estimation of Photon attenuation coefficient in high and low Z material.
20. Calculate the range of alpha particle.
21. Calculation of thicknesses of lead and concrete needed to reduce the gamma ray intensity to a particular value.
22. Calculation of binding energy of a given nucleus.

Miscellaneous Experiments

23. The student has to fabricate at least one experimental set up using integrated chips and other semiconductor devices.
24. To configure various shift registers and digital counters. Configure seven segment displays and drivers.
25. Use of timer IC 555 in astable and monostable modes and applications involving relays, LDR
26. To study temperature-dependence of conductivity of a given semiconductor crystal using four probe method.
27. To determine the Hall coefficient for a given semi-conductor.
28. To study the potential energy curve of the magnet-magnet interaction using air-track setup along with the simple experiments in mechanics.
29. To study the power dissipation in the SSB and DSB side bands of AM wave. To study the demodulation of AM wave.
30. To study various aspects of frequency modulation and demodulation.

NUCLEAR ACCELERATORS, REACTORS AND DETECTORS (NARD)

Subject Code: MPHYS1-460

L T P C

Duration: 45 Hrs.

4 0 0 4

UNIT- 1**Interactions of Nuclear Radiations and Neutron Detection (11 Hrs.)**

Introduction to radiations, types of radiations, Statistics of Counting, Nuclear electronics, Pulse shaping, Neutron discovery, neutron classification, neutron sources, Neutron detectors, slowing down of neutrons in matter, slowing down power and moderating ratio, Diffusion of thermal neutrons.

UNIT- 2**Nuclear Radiation Detectors (12 Hrs.)**

Detection of nuclear radiation, classification of detectors, Gas filled detectors, multiplicative regions, ionization chamber, Proportional counter, Geiger-Muller counter, Solid state detectors, Cerenkov detector, Wilson cloud chamber, Bubble chamber, Spark chamber, Nuclear emulsions, Solid state nuclear track detectors, Semiconductor detectors.

UNIT- 3**Nuclear Accelerators (10 Hrs.)**

Introduction of accelerators of charged particles: Classification and performance characteristics of accelerator, ion sources, Electrostatic accelerators (Cockroft---Walton accelerators), Cyclotron, Betatron, principle of phase stability, Synchro-cyclotron, Electron and Proton synchrotron, Microtron, Linear accelerator, drift tube and wave guide accelerator.

UNIT- 4**Nuclear reactors (12 Hrs.)**

Nuclear chain reactor, four factor formula, reactor design, classification of reactors, research reactor: graphite moderator, water boiler, swimming pool, light water-moderator, tank type; Heavy water-moderator: tank type, production reactor, power reactor: pressurized water reactor, boiling water reactors, heavy water moderated reactors, organic moderated reactors, Gas cooled reactors, Sodium graphite reactors, Liquid fuel reactor, Fast reactor, breeder reactors.

Recommended Books

1. Edward J.N. Wilson, 'An Introduction to Particle Accelerators', Oxford University Press, 2003.
2. James Rosenzweig, 'Fundamentals of Beam Physics', Oxford University Press, 2001.
3. P.N. Cooper, 'Introduction to Nuclear Radiation Detectors', Cambridge University Press, 1986.
4. S.S. Kapoor and V.S. Ramamurthy, 'Nuclear Radiation Detectors', Wiley Eastern, New Delhi, 1986.
5. G.F. Knoll, 'Radiation Detection and Measurement', John Wiley & Sons, 1989.
6. K.S. Krane, 'Introductory Nuclear Physics', John Wiley & Sons, 1975.
7. R.M. Singuru, 'Introduction to Experimental Nuclear Physics', Wiley Eastern Publications, 1987.

RADIATION PHYSICS

Subject Code: MPHYS1-461

L T P C

Duration: 45 Hrs.

4 0 0 4

UNIT--I**Radiations and Radiation Quantities (12 Hrs.)**

Sources and properties of α , β and γ - radiations, Interaction processes of α , β and γ - radiations with matter, Lambert-Beer Law, Linear and mass attenuation coefficients, Build-up factor: Exposure and energy absorption. Fluence, energy fluence, KERMA, Linear energy

transformation (LET), exposure rate and its measurement. Absorbed dose and its measurement; Bragg Gray Principle, Radiation dose UNIT-s- rem, rad, Gray and Sievert, dose commitment, dose equivalent and quality factor.

UNIT--II

Dosimeters (12 Hrs.)

active and passive dosimeters, Pocket dosimeter: film badges, thermo-luminescent dosimeters, optically stimulated luminescent dosimeters, solid state nuclear track detectors, chemical detectors, simple numerical problems on dose estimation.

UNIT- III

Applications (10 Hrs.)

Archaeological applications: Carbon dating; limitations and accuracy. Industrial Applications: Smoke detection, blockage/leakage detection of buried pipelines, thickness gauge, non-destructive testing. Agricultural Applications: benefits of radiation processing of food items, sterilization. Medical Applications: sterilization of medical equipment's, diagnosis and radiotherapy: in-vivo and in-vitro. Space Exploration: nuclear batteries/RTG.

UNIT-- IV

Radiation Effects and Protection (12 Hrs.)

Biological effects of radiation, acute and delayed effects, stochastic and non-stochastic effects, Dose response characteristics, Relative Biological Effectiveness (RBE). Permissible dose to occupational and non-occupational workers, safe handling of radioactive materials. ALARA, ALI and MIRD concepts, Rad waste and its disposal. Radiation Shielding: The point kernal technique, radiation attenuation from a uniform plane source. The exponential point-Kernal. Radiation attenuation from a line and plane source. Thermal and biological shields, shielding materials, shielding requirement for medical, industrial and accelerator facilities, Practical applications and some simple numerical problems.

Recommended Books:

1. G.F. Knoll, 'Radiation Detection and Measurement', 3rd Edn., John Wiley & Sons Inc., 2000.
2. E.B. Podgorsak, 'Radiation Physics for Medical Physicists', Springer, 2006.
3. R.M. Singru, 'Introduction to Experimental Nuclear Physics', Wiley Eastern Pvt. Ltd., 1974.
4. S.N. Ahmed, 'Physics and Engineering of Radiation Detection', Academic Press, 2007.

PHYSICS OF MATERIALS

Subject Code: MPHYS1-462

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

Polymer Materials (11 Hrs.)

Polymer Structure: Molecular Weight, Shape, Structure and Configuration; Thermoplastic and Thermosetting, Mechanical Behavior of Polymers-stress strain behavior, Macroscopic and Viscoelastic deformation, Fracture of polymers, Mechanical Characteristics-Fatigue, Tear Strength and Hardness, Mechanisms of Deformation and strengthening of polymers. Crystallization, Melting and Glass Transition Phenomena in Polymers.

UNIT- 2

Composite Materials (10 Hrs.)

Introduction, Particle-Reinforced Composites-Large, Fiber-Reinforced Composites: Influence of Fiber Length, Influence of Fiber Orientation and Concentration, The Fiber Phase, The Matrix Phase, Polymer-Matrix Composites, Metal-Matrix Composites, Ceramic-Matrix Composites.

UNIT- 3

Nano-Materials (11 Hrs.)

Emergence of Nanotechnology, Micro to Nanoscale materials, Characteristics of Nanomaterials- Band gap, surface to volume ratio, Electron confinement for zero, one and two dimensional nanostructures, synthesis of nanomaterials with top down and bottom up approach, Methods of Synthesis- ball milling, sol-gel, Electro-spinning and Lithography techniques, Carbon nanotubes (synthesis and properties), applications of nanomaterials.

UNIT- 4

Electrical, Magnetic and Thermal Properties of Materials (13 Hrs.)

Electrical Properties of Materials: Conduction in ionic materials, Dielectric behavior, Field vectors and polarization types, Frequency dependent dielectric constant, Other Electrical characteristics of materials and its applications: Ferroelectricity, Piezoelectricity.

Magnetic Properties of Materials: Magnetic materials and its classifications, Domain and Magnetic Hysteresis, Magnetic storage, Magnetic Anisotropy, Soft and Hard magnetic materials.

Thermal properties of materials: Heat capacity, Thermal expansion, Thermal conductivity and Thermal stresses.

Recommended Books:

1. William D. Callister, 'Materials Science and Engineering: An Introduction', 4th Edn., John Wiley & Sons, Inc.
2. G.M. Chow & K.E. Gonsalves, 'Nanotechnology - Molecularly Designed Materials', 2nd Edn., American Chemical Society.
3. K.P. Jain, 'Physics of Semiconductor Nanostructures', Narosa Publishing House, 1997.
4. G. Cao, 'Nanostructures and Nanomaterials: Synthesis, Properties and Applications', Emperial College Press, 2004.

NANO-PHYSICS

Subject Code: MPHYS1-463

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT- 1

Introduction to the Nanoscience (6 Hrs.)

Nano scale, Surface to volume ratio, Electron confinement in infinitely deep square well, Confinement in one and two-dimensional wells, Idea of quantum well, quantum wire and quantum dots, Comparison of Density states for 0D, 1D and 2D confined nanostructured materials with the bulk.

UNIT- 2

Synthesis of Nanostructures (15 Hrs.)

Top down and Bottom up approach for synthesis of nanoparticles, growth of nuclei, Growth controlled by diffusion and surface process in Zero Dimensional nanostructures.

Synthesis of One-Dimensional Nanostructures: Template-Based Synthesis, Electrochemical deposition, Electrophoretic deposition, Electrospinning and Lithography.

Synthesis of two-Dimensional Nanostructures: Fundamentals of Film Growth, Physical Vapor Deposition, Molecular beam epitaxy, Sputtering, Chemical Vapor Deposition, Atomic Layer Deposition, Self-Assembly, Sol-Gel Films, Langmuir-Blodgett Films.

UNIT- 3

General Characterization Techniques (12 Hrs.)

Determination of particle size, Structural Characterization: X-ray diffraction, Small angle X-ray scattering, Morphological Characterization: Scanning electron microscopy, Transmission electron microscopy, Atomic Force Microscopy, Scanning probe microscopy. Optical Characterization: photo luminescence (PL), Raman and FTIR spectroscopy of nanomaterials.

UNIT- 4

Special Nanomaterials and its Applications (12 Hrs.)

Structure of Fullerene, Methods of synthesis of Carbon Nanotubes, Properties of CNT; Electrical, Optical, Mechanical, Vibrational properties etc., Applications: Molecular Electronics and Nanoelectronics, Carbon Nanotube Emitters, Solar cells, Fuel Cells, Display devices.

Recommended Books:

1. G.M. Chow & K.E. Gonsalves, 'Nanotechnology - Molecularly Designed Materials', 1st Edn., American Chemical Society,
2. K.P. Jain, 'Physics of Semiconductor Nanostructures', Narosa Publishing House, **1997**.
3. G. Cao, 'Nanostructures and Nanomaterials: Synthesis, Properties and Applications', Imperial College Press, **2004**.

SOFT MATTER PHYSICS

Subject Code: MPHYS1-464

**L T P C
4 0 0 4**

Duration: 45 Hrs.

UNIT-1

Introduction to Soft Materials and the Glass Transitions (8 Hrs.)

Classification in terms of their thermal, mechanical and often unusual physical properties. The glass transition: General phenomenon and theoretical models, experimental determination.

UNIT-2

Introduction to Polymers (8 Hrs.)

Terminology and nomenclature, polymerisation mechanisms, molar masses and distributions, chain-dimensions and structures. Polymers in solution: Ideal solutions, Flory-Huggins theory, conformation entropy, dilute solutions.

UNIT- 3

Mechanical Properties of Polymers and Phase Separation (8 Hrs.)

Energy-elasticity, entropic spring, visco-elastic behaviour. **Phase Separation:** Mixing, de-mixing, simple fluid model, spinodal decomposition, metastability, fluctuations.

UNIT-4

Liquid Crystals and Colloids (11 Hrs.)

Thermotropic, lyotropic, orientational order, order parameters, Landau description of the Isotropic to nematic phase transition, optical retardation, Freederiksz transition. Colloids: Stability, fluctuations and forces, Stokes-Einstein, gels, emulsions and foams.

Recommended Books:

1. P.J. Collings & M. Hird, 'Introduction to Liquid Crystals', **1997**.
2. K.A. Dill & S. Bormberg, 'Molecular Driving Forces Garland', **2003**.
3. I.W. Hamley, 'Introduction to Soft Matter', Wiley Chichester, **2000**.
4. R.A.L. Jones, 'Soft Condensed Matter (OUP)', Oxford, **2002**.
5. D. Tabor, 'Gases, liquids & solids CUP', **1991**.

DISSERTATION

Subject Code: MPHYS1-465

**L T P C
0 0 8 8**

M.Sc. 4th Semester will carry the dissertation work under the supervision of the assigned project guide as per following scheme:

Format for writing dissertation work: The students will write the report in Times New Roman, with font size 12 and 1.5 spacing.

1. Title of the M.Sc. Dissertation Work	7. Introduction
2. Self-Declaration Certificate of Original Work	8. Methodology
3. Acknowledgement	9. Results and Discussion
4. Content	10. Conclusion
5. List of Tables	11. References
6. List of Figures	12. Student's Bio data

Evaluation Criteria: The maximum marks allotted for the dissertation will be 200 which comprises of internal evaluation of 80 marks and external evaluation of 120 marks. The details of internal and external evaluation are given below:

(A) Internal Evaluation: (MM:80)

The students will be evaluated based on regular performance, attendance and presentation. He/She should give power point presentation of their detail work during the mid-semester (1st and 2nd) examinations.

Final Submission Report:

The student will submit the final report as hard bound copies (03) and soft copy on CD/DVD. The internal awards will be given to the students after final submission of the report by the dissertation supervisor.

(B) External Evaluation: (MM:120)

Evaluation will be done based on originality and quality of work, knowledge and presentation skills etc. The students should give 30 minutes' presentation through power point slides in the front of a internal panel of three examiners including dissertation Supervisor, Head/Nominee and other faculty member of the Department as constituted by Head of the Department.

MRSPTU

SEMESTER 1 st		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFTE1-101	Drafting & Pattern Making	5	-	-	40	60	100	5
MFTE1-102	Textile Studies-1	5	-	-	40	60	100	5
MFTE1-103	Sketching & Fashion Illustration	5	-	-	40	60	100	5
MFTE1-104	History of Fashion	5	-	-	40	60	100	5
MFTE1-105	Computer Applications-I	5	-	-	40	60	100	5
Total		25	0	0	100	400	500	25

SEMESTER 2 nd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFTE1-206	Textile Studies-II	5	-	-	40	60	100	5
MFTE1-207	Inspirational Fashion	5	-	-	40	60	100	5
MFTE1-208	Knitting Technology	5	-	-	40	60	100	5
MFTE1-209	Pattern Drafting, Grading & Construction Studies	5	-	-	40	60	100	5
MFTE1-210	Computer Applications-II	5	-	-	40	60	100	5
Total		25	0	0	200	300	500	25

SEMESTER 3 rd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFTE1-311	Fashion Industry, Marketing & Management	3	-	2	40	60	100	4
MFTE1-312	Fashion Illustration and Appreciation	3	-	2	40	60	100	4
MFTE1-313	Garment Ornamentation Lab.	2	-	4	60	40	100	4
MFTE1-314	Advance Garment Construction Techniques Lab.	2	-	4	60	40	100	4
MFTE1-315	Computer Applications – III Lab.	2	-	4	60	40	100	4
Total		12	0	14	260	240	500	20

SEMESTER 4 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFTE1-416	Garment Production and Techniques	3	-	2	40	60	100	4
MFTE1-417	Design Collection	3	-	2	40	60	100	4
MFTE1-418	Survey and Project	2	-	4	60	40	100	4
MFTE1-419	Computer Applications – IV Lab.	2	-	4	60	40	100	4
MFTE1-420	Entrepreneurship Internship	-	-	8	40	60	100	4
Total		10	0	20	200	300	500	20

Overall

Semester	Marks	Credits
1 st	500	25
2 nd	500	25
3 rd	500	20
4 th	500	20
Total	2000	90

**QUESTION PAPER PATTERN
END SEMESTER EXAMINATION**

Time Allowed: 3 hrs.

Maximum Marks: 60

The question paper shall consist of three sections.

1. Section A is compulsory. It carries 16 marks. It consists of 4 questions of 4 marks each. One question should be set from each unit.
2. Section B consist of 4 questions of 08 marks each with atleast 1 question from each unit. The student has to attempt any 3 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

MRSPTU

DRAFTING AND PATTERN MAKING

Subject Code – MFTE1-101

L T P C
5 0 0 5

Duration – 60 Hrs.

UNIT- I

1. Standard measurement charts for children, Adult- Male and Female,
2. Taking measurements-three styles of taking measurements,
3. Drafting Tools,
4. Basic Grain lines - Straight, off, Bias,
5. Types of Anatomy (Brief) Joints and Muscles, Growth and development and Eight head theory,
6. Types of human figure,
7. Introduction to kids and adult pattern (drafting, pattern making, estimation and layout of the garment,
8. Definition of empire line, Princess line and flat pattern making,
9. Define layout.

UNIT-II

1. Creation of Bodice Block and Lower Block of Child and Adult,
2. Creation of Trouser Block of Ladies and shirt,
3. Creation of Sleeves: Plain, Puffed, Flare, Leg O' mutton, Ruffle, Cape, Raglan, Drop Shoulder, Tulip, Hanky, Bushirt, Kimono, Dolmon, Shirred, Bell, Bishop and Lantern,
4. Drafting of Collars: Peter Pan, Cape, Bias, Flat Tennis, Sailor, Chelsea, Bishop, Shawl, Wing, Shirt, Rippled, Chinese, Coat and Cowl.

UNIT-III

1. Creation of Kids: Slip, Panty and Romper,
2. Drafting of Frock: A-Line, Circular, Frock with Yoke, Frock with empire, Normal and low waist line,
3. Basic Skirt Block and its Adaption. Skirts: Gathered, Novelty Gathered, Two Tied, pleated (Knife, Box, Inverted, Sunray, Kick), Straight, A-Line, Pegged, Tulip, Circular, Gored, Handkerchief, Hip Rider and Slashed,
4. Drafting of Jumpsuit.

UNIT-IV

1. Designing of all Kinds of casual and formal wear garments for children (night suit and sundress),
2. Paper Patterns of all kinds of casual and formal wear garments for children (night suit, sundress, Frock, Skirt and Jumpsuit), on full scale, with all specification,
3. Drafting of Women's sari Blouse and choli blouse,
4. Drafting and paper patterns of all kinds of adult, casual and formal wear garments (blouse, top, skirt, salwar suit, night suit, nighty gown, kurta pajama, trouser), on full scale, with all specifications.

Recommended Books

1. Manmeet Sodhia, 'Advance Drafting and Draping'.
2. Sheria Doongaji Rajj Prakshan, 'Basic Processes and Clothing Construction'.
3. Premlata Malik, 'Garment Const. Skills'.

TEXTILE STUDIES-I

Subject Code – MFTE1-102

**L T P C
5 0 0 5**

Duration – 60 Hrs.

UNIT-I (6 Hrs.)

Overview of Textile Industry, Natural Fibres:

- a) Vegetable (bast, leaf and seed fibres),
- b) Animals (wool and silk),
- c) Mineral (glass, asbestos and metallic fibres),
- d) Cotton: concept of varieties; definition of grading, distinctive properties and end uses,
- e) Jute: - varieties, distinctive properties and end uses,
- f) Flax and Pineapple fibers: - brief introduction and uses,
- g) Protein fibers: -
Wool: Classification, distinctive properties and end uses,
Silk: classification, distinctive properties and end uses.

UNIT-II (9 Hrs.)

Man-made Fibres:

Classification:

- a) Regenerated fibres: Acetate, Viscose & diverse forms of viscose, Cuprammonium, alginate. - general properties, end uses,
- b) Synthetic fibers:- principles of poly condensation with reference to Polyesters, Polyamides and Polyurethanes, principles of poly addition with reference to Acrylics, Polyolefin, Polyvinyl chlorides and co-polymers,
- c) Chemical properties & end uses of polyester, polyamide and poly acrylonitrile fibers,
- d) Introduction to the production of manmade fibres:
- e) Principles of melt spinning, details of melt spinning process with special reference to polyester-parameters near spinneret, LOY, MOY & POY, dry spinning and wet spinning;
- f) Viscosity of melts and solutions,
- g) Equipment of manmade fiber production,
- h) Main features of the production of some important manmade fibers-viz., viscose, cellulose-acetate, polyamides, polyesters, polypropylene and poly acrylic fibers,
- i) Concept of quenching operation and finish application,
- j) Concept of micro denier fiber and aramid fibers. Preparatory Process for cotton - Stitching, Singeing, Desizing, Scouring, Bleaching and Mercerization, Preparatory Process for wool and silk, Preparation of blends

UNIT-III

Staple Fiber Spinning (brief idea): Introduction, Raw material, Ginning, Opening, Cleaning, Blending, Equalizing, Drafting, Yarn Formation, Different systems of spinning. Yarn classification, yarn spinning, yarn numbering system. Fiber quality requirements for suitability of fabrics.

UNIT-IV

Elementary idea of the processes of conversion of conversion of yarn into fabric, i.e., weaving, knitting, non-woven.

Industrial Visit.

Recommended Books

1. K.V.P. Singh, 'Introduction to Textiles'.
2. Bernard P. Corbman, 'Textiles-Fiber to fabric', McGraw Hill.

SKETCHING AND FASHION ILLUSTRATION

Subject Code – MFTE1-103

**L T P C
5 0 0 5**

Duration – 60 Hrs.

UNIT-I

1. Introduction to basics of Sketching & Drawing,
2. Perspective Drawing is an exercise to make the student understand the various perspectives of a form like buildings etc. It will enable the artist to understand the depths the angles and proportions of a form when viewed from a distance.
3. Quick Sketching (doing sketches without eraser in 3-5 minutes),
4. Fashion Cycle, Fashion influence,
5. Define Fashion Forecasting how to use the couture and ready to wear,

UNIT-II

1. Describe Colour,
2. Dimensions of colour- hue, intensity and value,
3. Prepare Chart (colour wheel, colour mixing, complimentary, analogues, split complimentary, warm and cool colours, tint, tones and shades, monochromatic, achromatic, pastel, dusty pastel- the effect of these colour schemes,
4. Effects of colours- red, green, blue, yellow, pink, orange, purple, black, white, grey, neutral,
5. Definition of Textures-what is the uses of in fashion designing, and types and textural effects,
6. Textures (thread pulling, thread crumple, thread rolling, paper dabbing, wax rubbing, wax drop, smoke, blade, leaf, flower, butterfly, lace, jute, thumb, match stick, sponge, cabbage, potato, onion, chilly, lady finger, ink drop, ink blow, batik, dry brush, leather, mesh, comb and cloth dabbing etc.,
7. Fabric rendering effects- plain cotton, chiffon, tissue, brocade and denim.

UNIT-III

1. Fashion terminology commonly used in the industry,
2. Classic and innovative fashion details – necklines, collars sleeves, cuffs, waist line, skirts, trousers, yokes, pockets etc.,
3. Flat sketch of garments,
4. Elements of design and principles of design.

UNIT-IV

1. Illustrate female croquis – Block figure, flashing figure and stick figure,
2. Fashion block figure with all kind of poses,
3. Draping executive wear and casual wear on flashing figure,
4. Explain theme board, mood board client board, research board and color board.

Recommended Books

1. Manmeet Sodhia , ‘Design Studies’.
2. Marry Garthey, ‘Fashion and Colour’.
3. Patric Jone Ireland Batsford, ‘Encyclopedia of Fashion details’.
4. Abling Fairchild, ‘Fashion Sketch Book’.

HISTORY OF FASHION

Subject Code – MFTE1-104

**L T P C
5 0 0 5**

Duration - 60 Hrs.

UNIT-I

History of Indian Costumes: Origin of clothing, changing scenario of Indian costumes,

Major Civilizations of the world, Study of regional costume and lifestyles of India, Costume and fashion in Mohan jo daro period, Principles and classification of fashion, Study of costume from earlier time to present time, Christian Dior (New Look), Charleston Era in lace, satin and silk. Explain all history of fashion Indian/western from 1890 to 1990. Principles of fashion and classification of fashion.

UNIT-II

Indian traditional textiles (embroidered-kasida, chicken-kari, kantha, phulkari. Traditional embroideries of chamba ruma, Kathiawar, kutch, gujarati, sindhi, gold and silver embroidery. Fabric, colour, motifs, stitches used in Indian traditional embroidery. Brief history of woven textiles in india Woven Indian Textiles- Production Process- Printed (Hand block, sanganeri). Dye- (Ikkat, patola and tie and dye). Painted- (Kalamkari).

UNIT-III

Traditional Costumes of the people of Punjab (Male and Female Costumes), Jammu & Kashmir (Hindu and Muslim), Himachal Pardesh People of Upper & Lower Hills (Gaddies & Paharies), Rajasthan, Gujarat, Madhya Pardesh, Uttar Pardesh, Maharashtra.

UNIT-IV

Ancient Civilization: Roman (Toga and its influence), Greek (chiton, and types and its influence) Italian and French influence in global fashion.

Recommended Books

1. Manmeet Sodhia, 'History of Fashion'.
2. B. Parul, 'Traditional Indian Textiles'.

COMPUTER APPLICATIONS-I

Subject Code – MFTE1-105

L T P C
5 0 0 5

Duration - 60 Hrs.

UNIT-I

What is computer? Applications of Computer, Characteristics of Computer Types of computer. Generations of Computers, Input and output Devices, Various storage devices like HDD, Optical Disks, Flash Drives. Different Types of data file formats: Types and Applications.

UNIT-II

Explain computer software, types of software (application and system software). Office Automation (Word processing, Spreadsheet, Presentation, Corel draw, adobe Photoshop), operating system, roll of operating system the, user interface-GUI and CUI. Different operating systems- Unix, Dos, Window, Mac, Window NT, Window XP, Window 7,8, Linux.

UNIT-III

Different computer graphic files like- GIF, JPEG, PNG, BMP, TIFF etc. Introduction to computer graphic applications. Image scanner, types installation, basic of scanning, basic computer graphic skills (using Corel draw, macromedia fireworks, adobe Photoshop). Definition and difference between raster and vector graphics. Installing and using a scanner. Scanning and saving files in different file formats according to file size and resolution.

UNIT-IV

What is internet. Internet concepts common software used on internet (browser, e-mail, web server, domain name server, browser plugins). WWW, web page, websites. General types of sites, simple profile websites, web portal, search engine google, yahoo, Lycos, rediff search. What is network different structure of network, network topologies.

Recommended Books

1. Peter Norton, 'Introduction to compute', 4th Edn., TMGH.

TEXTILE STUDIES – II

Subject Code – MFTE1-206

**L T P C
5 0 0 5**

Duration - 60 Hrs.

UNIT-I

Identification of fabric samples (warp and weft direction). Different types of weaves/weaving designs – plain, satin, sateen, twill, jacquard, bird's eye, basket, ribbed, crepe, pile, lappet, dobby, triaxial. Properties and uses of each of the weaves. Essential properties of fabric.

UNIT-II

Comparative studies of the woven and knitted fabrics- construction and advantages of each. Elementary idea of machinery used in woven, knitted and non-woven fabrics.

UNIT-III

Non - woven – classification. Method of production of non-woven web formation, bonding the web, needle punching the web, finishing. Characteristics of non-woven fabrics. Uses of non-wovens. Decorative fabric construction- braiding, netting, lace. Analyses of fabric samples-file work.

Recommended Books

1. K.V.P. Singh, 'Fabric Studies', Kalyani Publishers.
2. Bernard P. Corbman, 'Textiles - Fiber to Fabric', McGraw Hill.

INSPIRATIONAL FASHION

Subject Code – MFTE1-207

**L T P C
5 0 0 5**

Duration - 60 Hrs.

UNIT-I

Designing on themes like culture, environment, monuments, seasons etc. Illustrating dresses made on innovative themes.

UNIT-II

Appreciation of any five Indian Fashion Designers. Collection and illustration of the work of these Indian designers. Brief history on the work of these designers. The famous and celebrated designs of these designers The shows, studios, and expertise of these designers.

UNIT-III

Designing Clothes line for Kids wear using different themes and fabrics. Designing clothesline for Women wear using different themes, fabrics, and surface ornamentations. Different Presentation Techniques- its forms and purpose. Collage work- collage on the dress, collage in the background, its effective use.

Swatch board- and the use of swatches on the surface texture of the dresses illustrated front and back illustration- the use and different illusion effect.

Client board and its effective use in designing dresses for a particular client.

Stylization of fashion figures, stylization of dresses. Textural effects- effect of silk, velvet, net, chiffon, satin, brocade, etc. Survey board, mood board and theme board.

Recommended Books

1. Kathryn Mckelvey, 'Illustrating Fashion', Blackwell Series.
2. Elisabetta Drudi, 'Fashion Design, Drawing and Presentation', Batsford.
3. Meher Castelino, 'Fashion Kaleidoscope', Rupa and Company.
4. Hindol Sengupta, 'Indian Fashion', Pearson Education.

KNITTING TECHNOLOGY

Subject Code – MFTE1-208

**L T P C
5 0 0 5**

Duration - 60 Hrs.

UNIT-I

Knitted garments-introduction. Difference between woven and knitted structures. Classification of knitted garments. Weft knitted fabrics- plain, rib, purl, etc. Warp knitted fabrics- tricot, kitten raschel, crochet, Milanese knit, simplex Other knitted constructions- jacquard, pile, fleece, high pile, terry knit, velour knit.

UNIT-II

Fully cut knitted garments- knit type, uses. Fully fashioned knitted garments- knit type, uses Integral knitted garments- knit types, uses. Cut stitch shaped knitted garments- knit type, uses, processes involved.

UNIT-III

Seam and stitches used in knitting. Machinery used for knitted garments- Flat bed, two-bar warp knitting machine, circular jacquard knitting machine, circular pile knitting machine. Quality control Defects in knitted fabrics. Industrial visit.

Recommended Books

1. 'Knitting Technology', Kalyani Publishers.
2. Bernard P. Corbman, 'Textiles-Fiber to Fabric', McGraw Hill.

PATTERN DRAFTING, GRADING & CONSTRUCTION STUDIES

Subject Code – MFTE1-209

**L T P C
5 0 0 5**

Duration - 60 Hrs.

UNIT-I

Market survey of fabrics, buttons, laces and other trimmings used in garment construction. Tailoring techniques- basic hand stitches, seams and seam processes, neckline finishes, pockets, plackets, tucks, fasteners, frills, etc.

UNIT-II

Designing of child garments on different themes. Designing of adult garments on different themes. The layouts, markers and Plans ($\frac{1}{4}$ or $\frac{1}{6}$ scale), Paper patterns of different garments with varied fashion elements on full scale. The paper patterns should be marked properly. Grading of the patterns to smaller and bigger sizes. Introduction to the sewing machine Cutting and sewing- processes involved and precautions, etc. Construction of any five garments for children Construction of any five garments for Adults having different themes, different fashion elements, and different surface ornamentation.

UNIT-III

Introduction to contemporary embroideries stitches- stem, back, running, dot, seeding, straight, chain, open chain, twisted chain, wheat tear, lazy daisy, blanket, buttonhole, zigzag chain, double chain, raised chain, spider's web, sheaf, brick. Florentine, holbien, Pekinese, cut work, four sided, goblin, woven bars, cretan, fly. French knots, bullion knots, German knots, fish bone, Romanian, satin, long and short, couching, Jacobean trellis, thorn, cross stitch, chevron, herringbone, appliqué work. Ribbon work, lace work, rope work, other decorations and trimmings.

Recommended Books

1. Manmeet Sodhia, 'Garment Construction', Kalyani Publishers.
2. Gerry Cooklin, 'Garment Technology for Fashion Designers', Blackwell Science.
3. Judy Brittain Dorling, 'Step by Step Needlecraft Encyclopedia', Kindersley.
4. Harold Carr, 'The Technology of Clothing Manufacture', Blackwell Science.

5. Winifred Aldrich, 'Fabric, Form and Flat Pattern Cutting', Blackwell.
6. K.R. Zarapkaar, 'Zarapkaar System of Cutting', Navneet.

COMPUTER APPLICATIONS – II

Subject Code – MFTE1-210

L T P C
5 0 0 5

Duration - 60 Hrs.

Introduction to Graphics and Graphics Devices

Computer Graphics, Graphics Output Devices and their general properties like (resolution and color capability), Graphics Input Devices, Drawing Geometry.

Introduction to coordinate Frames and Color Theory

Points, Vectors and Lines. Two dimensional Cartesian reference frames, Screen Coordinates, Three dimensional Cartesian reference frames.

Introduction to Color Theory

Introduction to Color Modes

Working with different color models and modes, using custom colors, picking colors, Analyzing and editing colors, looking at gamut issues, creating duotones, setting color balance, setting hue and saturation, adjusting brightness and contrast, working with histograms, retouching images, Color ranges and replace color options, cropping images, Understanding Process and spot colors, choosing pantone colors, Applying fill and stroke colors.

Mastering Computer Graphics Skill using Corel Draw

Introduction to CorelDraw

Introduction to Vector and Raster Graphics Type. Starting CorelDraw, Introduction to Corel Draw Menu, Introduction to CorelDraw Page Setup. Introduction to various tools of CorelDraw.

Working with Shapes, Lines, Texts & Objects

Creating rectangles, squares, Circles, Ellipses, Polygons, Stars and Spirals. Selecting Fill and Outlines to any shape.

Moving & Rotating Shapes freely and to Fixed angles. Drawing Curve and Straight Lines, Creating Simple and Artistic Texts. Formatting Texts by changing Font, Size and Shape of Text. Rotating texts, assigning a Fill Color to text, Assigning outline color to text. Creating Paragraph Text, Aligning Texts, Adjusting Line & Letter Spacing in the paragraph text. Spell checking and finding and replacing texts.

Selecting Single and Multiple Objects, Duplicating Objects, Grouping Objects, Trimming Objects, Locking and Unlocking Objects, Aligning Objects.

Working with Outlines and Fills

Introduction to outlines, defining outline width using Outline Fly out, Outline Pen Dialog Box, Setting the Line Cap Style, Changing the Outline Color
Introduction to Fills, Uniform Fill, Fountain Fill, Two-Color Fountain Fill, Preset Fountain Fill, Pattern Fills, Two-Color, Full Color and Bitmap Pattern Fills, Texture Fills, PostScript texture Fills.

Working with Curves

Introduction to Curves, Nodes and Segments, Drawing Freehand Tools, Drawing Closed Curves, Curved Objects, Selecting Node on a Curved Object, Adding, Removing and Joining Nodes. Bezier Tool, Drawing Curve with Bezier Tool, Drawing Straight Line with Bezier Tools. Drawing with Artistic Media Tools using Preset and Brush Mode. Calligraphic Mode, Pressure- Sensitive Mode, Object Sprayer.

Special Effects

Introduction to Special Effects, Blending Tool, Contouring Objects, Distorting Objects, Envelop Tool, Extruding of the object, Vector Extrusion. Drop Shadow, Creating Drop Shadow, Changing Color of Drop Shadows, Removing Drop Shadows. Applying Lenses, Applying Perspectives.

Filters, Gradients, Patterns, Textures, Swatches Effects

Layouts (Development of different types of Boards)

Drawing Basic Male, Female and Kids Figure in Corel Draw with Grids and Guidelines and Converting them into Objects

Drawing Basic Figure Forms (Legs, Arms, Head etc.) with Grids and Guidelines and Converting them into Objects.

Saving and Exporting Images.

File formats, opening, saving, importing, exporting, compression, printing, saving for web, publishing as PDF, exporting images with transparency. Printing Images.

Recommended Books

1. Ramesh Bangia, 'Corel Draw'.
2. 'Computer Graphics for Fashion Designing (Practical)'.

FASHION INDUSTRY, MARKETING & MANAGEMENT

Subject Code – MFTE1-311

L T P C

Duration - 60 Hrs.

3 0 2 4

UNIT-I

1. Introduction to Fashion Industry,
2. Indian and Global Fashion Market,
3. Levels of fashion industry- couture, ready to wear, mass production.
4. Organizational set-up of fashion industry,
5. The different departments, personnel and their jobs,
6. Career in fashion industry

UNIT-II

1. Introduction to Marketing,
2. Nature and Scope of Marketing,
3. The Marketing Concept, Market Segmentation,
4. Targeting and Positioning,
5. Strategic Marketing,
6. Fashion market and marketing environment,
7. Fashion marketing planning,
8. Market research,
9. User's buying behavior,
10. Marketing communication.

UNIT-III

1. Management- Concepts, Principles & Characteristics,
2. Advertising,
3. Sales promotion techniques,
4. Exhibitions & sales, fashion shows (concept and presentation skills, publicity campaigns),
5. Retailing- department stores, apparel specialty stores, discount retailing, franchise retailing, malls, direct selling, internet selling, catalogue selling, etc.,
6. Project.

Recommended Books

1. Pooja Chatley, 'Fashion Marketing & Merchandising', Kalyani Publishers.

2. Mike Essay, 'Fashion Marketing', Blackwell Science.
3. Helen Goworek, 'Fashion Buying', Blackwell'.

FASHION ILLUSTRATION AND APPRECIATION

Subject Code – MFTE1-312

**L T P C
3 0 2 4**

Duration - 60 Hrs.

UNIT-I

1. Inspirational designing and presentation,
2. Design studio -designing based on different themes for a fashion show,
3. Listing of all aspects of the show- the background, the lights, the ramp, the accessories, the make-up, the fabric, surface ornamentation, etc.,
4. Accessory designing and illustration,
5. Illustration of Jewelry using various mediums like pearls, beads, gold and silver, diamonds, wood, wires, velvet, net, etc.,
6. Designing and illustration of head gears,
7. Designing and illustration of bags and belts using various mediums like leather, cane, pearls, beads, wires, velvet, net, etc.,
8. Designing and illustrating footwear of all types,
9. Designing and illustrating bows and ties on varied dresses,
10. Illustrating hairstyles.

UNIT-II

1. Appreciation of Western Fashion,
2. A brief history of any five western designers,
3. Collection and illustration of the famous designs of these designers,
4. Popular and celebrated shows of these designers,
5. The studios and their expertise of these designers.

UNIT-III

1. Fashion Capitals – France and Milan - the designers, the design houses, the shows, the fashion markets, the labels, the institutes, the events, etc.,
2. Fashion Capital –London - the designers, the design houses, the shows, the fashion markets, the labels, the institutes, the events, etc.,
3. Fashion Capital–Mumbai- the designers, the design houses, the shows, the fashion markets, the labels, the institutes, the events, etc.,
4. Introduction to Fashion photography,
5. Cameras, Lenses and Films,
6. Lighting Equipment and Studio Locations,
7. Fashion Shots.

Recommended Books

1. Kathryn Mckelvey, 'Fashion Design Process-Innovation & Practice', Blackwell.
2. Gavin Waddell, 'How Fashion Works', Blackwell.
3. Alex Larg, 'Fashion Shots', Roto Vision.

GARMENT ORNAMENTATION LAB.

Subject Code – MFTE1-313

**L T P C
2 0 4 4**

Duration - 72 Hrs.

UNIT-I

1. Studying the designs and motifs of traditional embroideries of India- phulkari, chichenkari, kasida, kanthas, kathiawaar, kutch, sindhi, gujarati, chamba rumal.

2. Colours, fabric and stitches of the Traditional embroideries of India- phulkari, chichenkari, kasida, kanthas, kathiawaar, kutch, sindhi, gujarati, chamba rumal.
3. Preparation of samples of the traditional embroideries of India.

UNIT-II

1. Designing embroidery patterns from different sources like objects, photographs, nature, greeting cards, posters, surroundings etc.,
2. Creating embroidery patterns designed from different sources,
3. Sequin work,
4. Lurex work. Lace and ribbon work,
5. Decorations and trimmings.

UNIT-III

1. Understanding the processes of Tie and dye, batik printing, screen printing and block printing,
2. Preparation of samples of all processes of Tie and dye,
3. Preparation of sample of batik printing- wax resistant dyeing.
4. Preparation of a sample with screen printing.
5. Preparation of a sample of block printing.

Recommended Books

1. Parul B, 'Traditional Indian Textiles', Abhishek Publications.
2. Manmeet Sodhia, 'Dress Designing', Kalyani Publishers.
3. Manmeet Sodhia, 'History of Fashion', Kalyani Publishers.

ADVANCE GARMENT CONSTRUCTION TECHNIQUES LAB.

Subject Code – MFTE1-314

L T P C

Duration - 72 Hrs.

2 0 4 4

UNIT-I

1. Metric method of drafting of bodice for a child,
2. Metric method of drafting of bodice for an adult,
3. Metric method of drafting of sleeve for a child,
4. Metric method of drafting of sleeve for an adult,
5. Application of metric method of drafting any one innovative sleeve, collar and a skirt,
6. Draping of bodice, yokes, cowls, etc., on a body form using muslin cloth and later, creating a pattern of the same on the drafting paper,
7. Draping of sleeves and collars, on a body form using muslin cloth and later, creating a pattern of the same on the drafting paper,
8. Draping of skirts on a body form using muslin cloth and later, creating a pattern of the same on the drafting paper,
9. Draping and creating muslin and paper patterns of Different Costumes,
10. Dart manipulation.

UNIT-II

1. Study of fashion forecast, market survey, interpretation,
2. Designing of costumes of varied themes, silhouettes, fabrics, surface ornamentation etc. based on the forecast study,
3. Creating full scale patterns of these self-designed costumes.

UNIT-III

1. Construction of any eight innovative garments for all age groups, for different themes, occasions, seasons (Fall Winter, Fall Spring, and Fall Autumn),
2. After cutting and sewing of the garment, student will also be taught quality control check, finishing and packaging of the garment.

Recommended Books

1. Manmeet Sodhia, 'Advanced Drafting and Draping', Kalyani Publishers.
2. Connie Amaden Crawford, 'The Art of Fashion Draping', Fairchild.
3. Natalie Bray, 'Dress Fitting', Blackwell Science.

COMPUTER APPLICATIONS – III LAB.

Subject Code – MFTE1-315

**L T P C
2 0 4 4**

Duration - 72 Hrs.

Drawing the details of the following in Corel Draw and Applying various texture and effects:
Fashion Details/ Silhouette,

1. **Collar:** Mandarin, High Bias, Tuxedo, Cape, Flat Tennis, Sailors, Chelsea, cowl, bishop.
2. **Sleeves:** Raglan, Hanky, Tulip, Ruffle, Dolman, virago, flare, lantern, Dalmatian, pagoda.
3. **Accessories:** Bags, Belts, Caps, Bows, Jewelry.
4. **Pockets:** Flap, Pouch, Patch, Cross, Slit, Kurta
5. **Skirts:** Novelty Gathered, Hip rider, Trumpet, Pegged, Circular, Pleated, Straight, ALine, straight fitted, fishtail, petal, peplum, puff ball.
6. **Trousers:** Jeans, Straight Pants, Baggy Pants, Jump Suit, Dungries, jogging pants, trouser skirt, Capri, hipsters, baggy jeans, bell bottoms, northern soul, riding habits.
7. **Silhouette:** A Line, funnel shaped, circular, straight, rectangular,
8. **Illusion Effects:** created by fashion details, elements of design, colour, Textures.

Draping the above created details on fashion figures. Importing, Saving and exporting images for the web. Printing Concepts.

GARMENT PRODUCTION AND TECHNIQUES

Subject Code – MFTE1-416

**L T P C
3 0 2 4**

Duration - 60 Hrs.

UNIT-I

1. Introduction to Garment Technology,
2. Production Planning and Control,
3. Layout –uses and importance, types- single line, double line, product layout, process Layout.
4. Basic work measurements – work measurements, elements, timing, timing errors, rating, allowances, standard time calculation, PMTS.
5. Balancing – basics, theoretical balance, skills inventory, initial balance, balance control.

UNIT-II

1. Principles of Cutting- types of cutters/scissors,
2. Principles of Sewing Technology- types and machines and accessories to speedup up and modernize the basic sewing,
3. Principles of Pressing- types of press,
4. Principles of Garment Finishing & Inspection, Packaging - various methods, people involved, precautions.

UNIT-III

1. Production Department Organization-personnel, their job profiles, their responsibilities,
2. Operation and Communications,
3. Quality control at each stage of Production,
4. Quality standards- ISO, etc.,
5. Quality from design to dispatch,
6. Industrial Visits.

Recommended Books

1. A.J. Chuter, 'Introduction to Clothing Prod. Mgmt.', Blackwell Series.
2. Gerry Cooklin, 'Garment Technology for Fashion Designers', Blackwell.

DESIGN COLLECTION

Subject Code – MFTE1-417

L T P C

Duration - 60 Hrs.

3 0 2 4

1. Preparation of a Portfolio of illustrated innovative garment designs prepared using different themes picked from various sources (magazines, books, films, nature, surroundings, handicrafts, paintings, etc.) and presented using different presentation skills and mediums,
2. A portfolio will be prepared by each student; in which he / she shall display his collection of themes, using different presentation skills,
3. Each theme will be accompanied by a line of costumes designed using that particular theme as an inspiration,
4. Different mediums and presentation skills should be used,
5. The portfolio should have atleast 12 lines of costumes,
6. To justify the theme of the dress, the theme could be seen in the colour of the dress/ silhouette of the dress/ surface texture of the dress/surface ornamentation of the dress/accessories accompanying the dress,
7. Amongst these lines, the students will shortlist any two garments and construct the same,
8. Prior to the construction, the working sketch, layout, paper pattern of these two designs should be created.

Recommended Books

1. Dickerson, 'Fashion from Concept to Consumer', Pearson.

SURVEY AND PROJECT

Subject Code – MFTE1-418

L T P C

Duration - 72 Hrs.

2 0 4 4

1. Students work on a Project Studying the Traditional aspects, culture, people, monuments, handicrafts etc. of an Indian state and form a report of their findings in the form of a thesis.
2. Garments are designed using the inspirational objects as the theme of the garment. These garments are illustrated and added to the report.
3. The student selects one of the garments, makes its working details, specification sheet, layout, and pattern and constructs that garment to be showcased along with the final thesis.
4. The report/ thesis should consist of:
 - a) Objective of the report
 - b) Acknowledgements
 - c) Introduction of the report
 - d) Detailed description of the traditional aspects
 - e) Illustrations of the garments designed
 - f) Specification sheet of the final garment
 - g) Sketch/ Picture of the final garment
 - h) Summary of the report
 - i) Bibliography.

COMPUTER APPLICATIONS – IV LAB.

Subject Code – MFTE1-419

**L T P C
2 0 4 4**

Duration - 72 Hrs.

Course Objectives

To teach the student to create a Computerized Technical Specification Sheet of any garment given to her / or as visualized by her. The Specification Sheet must contain both the Technical Illustration meant for the production / manufacturing of the garment and also the Fashion Illustration meant for the presentation / demonstration/display of the garment before production.

Software to be Used

1. Any spreadsheet application (like Microsoft Excel) for Creating the Technical Specification Sheet. (The Spreadsheet application should have graphic import capabilities).
2. Any Illustration Software having standard illustration tools, layer functionality and capability to export/save graphics in different file formats (jpeg, gif, bmp, tiff, psd etc.) and different resolutions. Preferably CorelDraw.

Taking a garment (from a good fashion magazine) as an inspiration create the following using the software mentioned above.

1. Technical Illustration (right measurement /proportions) (both front & back) meant for the production/manufacturing of the garment. This illustration should include basic
 - a) Silhouette
 - b) Stitch Lines
 - c) Trims
 - d) Other Fashion Details like Plackets, Pockets, Collars, and Cuffs etc.

The student must learn to export the graphics into different file formats of different dimensions and dpi (resolution) for use in digital/print portfolios/specification sheets/websites/emails etc. The student should also know to export each layer individually and combined.

2. Fashion Illustration meant for the presentation/demonstration/display of the garment before production. The student must learn to use Corel Draw to create the Fashion illustration of the garment taken above (As done on paper in previous semesters). This fashion illustration must include the following (on different layers that will depict different stages of the garment design):
 - a) croqui
 - b) croqui in motion,
 - c) design silhouettes,
 - d) color / texture / print on dress
 - e) Accessories.
 - f) Make swatch board

The student must learn to export the graphics into different file formats of different dimensions and dpi (resolution) for use in digital/print portfolios/specification sheets /websites /emails etc. The student should also know to export each layer individually and combined.

3. Creating a Computerized Specification Sheet (in Microsoft excel). The Specification Sheet must include,
 - a) The necessary details like dress description, material to be used, color, trims etc.,
 - b) Fashion Illustration of the selected garment,
 - c) Technical Sketch of the selected garment (front & back),

- d) Swatches,
- e) Costing.

Saving, archiving (on CD Rom), emailing the files as attachments.

Study any Industrial Grade Fashion Design Software and prepare a report of it.

ENTREPRENEURSHIP INTERNSHIP

Subject Code – MFTE1-420

**L T P C
0 0 8 4**

Duration - 96 Hrs.

1. Introduction to Entrepreneurship,
2. Study of various essential aspects of Entrepreneurship,
3. Identification and development of essential entrepreneurial skills,
4. Entrepreneurship Development,
5. 1-Month Entrepreneurship in the Garment Industry, working on Designing and finally forming a survey report on the industry, its type, its working, its departments and personnel, jobs undertaken, references, Observations, Precautions, etc.,
6. The report should have a detailed information about the industry the student joined for entrepreneurship, the type of industry (public sector/ private/partnership), the names of directors, the departments of the industry, its personnel, their working, the jobs being undertaken at the industry, the products being manufactured, the marketing of the products, the raw material being used, the clients, etc.,
7. The report should also include the work done by the student during his/her training, specifying what all new was learned during this period,
8. The report should be accompanied by the training certificate from the industry,
9. It should be signed by the student.

MRSPTU M.Sc. FASHION TECHNOLOGY SYLLABUS 2017 BATCH ONWARDS

SEMESTER 1st		Contact Hrs. 32			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFTE1-101	Structure and Properties of Fibres, Fabrics and Garments	3	1	0	40	60	100	4
MFTE1-102	Modern Technology of Fabric and Apparel Production	3	1	0	40	60	100	4
MFTE1-103	Advanced Textile & Garment Designing Concepts	3	1	0	40	60	100	4
MFTE1-104	Apparel Testing and Quality Characterisation	3	1	0	40	60	100	4
Department Elective-1		3	1	0	40	60	100	4
MFTE1-156	Fashion Design Concepts							
MFTE1-157	High Performance Fibres							
MFTE1-158	Theory and Design of Garment Machinery							
MFTE1-159	Fabrics Properties and Textile Designing							
MFTE1-160	Structure and Properties of Fibres							
MFTE1-105	Garment Development Lab.-I	0	0	4	60	40	100	2
MFTE1-106	Textile and Apparel Testing Lab.	0	0	4	60	40	100	2
MFTE1-107	Independent Study	0	0	4	60	40	100	2
Total		15	5	12	380	420	800	26

SEMESTER 2nd		Contact Hrs. 32			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFTE1-208	Developments in Specialty Yarns & Texturing	3	1	0	40	60	100	4
MFTE1-209	Functional Textiles & Garments – I	3	1	0	40	60	100	4
MFTE1-210	Functional Finishes of Garments	3	1	0	40	60	100	4
MFTE1-211	Advances in Apparel Technology	3	1	0	40	60	100	4
Departmental Elective-II		3	1	0	40	60	100	4
MFTE1-261	Production Planning & Operation Management							
MFTE1-262	Technical Textiles and Smart Garments							
MFTE1-263	Environment Management & Eco-friendly Textiles							
MFTE1-264	Modern Methods of Apparel Merchandising & management							
MFTE1-212	Garment Development Lab.-II	0	0	4	60	40	100	2
MFTE1-213	Software Packages Lab.	0	0	4	60	40	100	2
MFTE1-214	Independent Study	0	0	4	60	40	100	2
Total		15	5	12	380	420	800	26

MRSPTU M.Sc. FASHION TECHNOLOGY SYLLABUS 2017 BATCH ONWARDS

SEMESTER 3 rd		Contact Hrs. 24			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MREM0-101	Research Methodology	4	0	0	40	60	100	4
Departmental Elective-III		3	1	0	40	60	100	4
MFTE1-365	Managing the Supply Chain							
MFTE1-366	Automation of Apparel Production							
MFTE1-367	Apparel Production CAD/CAM Systems							
MFTE1-368	Computer Aided Pattern Design							
MFTE1-369	Utility Properties of Cloth and Apparels							
Open Elective-I		3	1	0	40	60	100	4
MFTE1-315	Seminar on Advanced Topics	0	0	4	60	40	100	2
MFTE1-316	Minor Project	0	0	4	60	40	100	2
MFTE1-317	Advanced Garment Designing and Making Or Home Fashion Lab.	0	0	4	60	40	100	2
Total		10	2	12	300	300	600	18

SEMESTER 4 th		Contact Hrs. 40			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFTE1-418	Dissertation	0	0	40	Satisfactory/ Unsatisfactory		100	20

Overall

Semester	Marks	Credits
1 st	800	26
2 nd	800	26
3 rd	600	18
4 th	100	20
Total	2200	90

STRUCTURE AND PROPERTIES OF FIBRES, FABRICS AND GARMENTS

Subject Code: MFTE1-101

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To introduce structure, properties of fibres, fabrics and garments.

Unit-I

Raw Material: Physical and chemical properties, manufacturing, process from polymer to fibers stage. Basic principles of fibre spinning, Spinning processes: Melt spinning. High speed spinning, spinning of microfibre, solution spinning process: Dry and wet spinning. Manufacture and specifications of raw materials and monomers. Heat-setting of fibres. Regenerated fibres: Viscose, Lyocell, high tenacity regenerated fibres, regenerated protein fibres, their methods of manufacture, physical & chemical properties and applications. Synthetic fibres: nylon 6 and 66, PET, PAN, their methods of manufacture, physical & chemical properties and applications.

Unit-II

High Performance Fibres: Introduction to PU, PTFE, aramid, carbon fibre, etc. their methods of manufacture, physical & chemical properties and applications. Brief idea on microdenier, bicomponent, hollow fibres and other developments in fibres.

Staple Yarns-Conventional ring spinning, open end spinning, friction spinning, self-twist spinning twist less spinning. Filament yarns- Wet, Dry and melt spinning.

Unit-III

Fabric Geometry: woven and other types of fabrics. Importance of fabric geometry and constructional parameters on the Bending, crease, Air permeability and handle and comfort properties.

Unit-IV

Structure of Garments: patterns, Draping and grading. Effect of fabric properties like GSM, Thickness on the Drape behaviour.

Recommended Books

1. R. Meredith, 'The Mechanical Properties of Textile Fibres', North Holland Publishing Co.
2. W.E. Morton and J.W.S. Hearle, 'Physical Properties of Textile Fibres', The Textile Institute, UK.
3. V.B. Gupta and V.K. Kothari, 'Manufactured Fibre Technology', Chapman and Hall, London.
4. Jacob Solinger, 'Apparel Manufacturing Handbook', Van Nostrand Reinhold Company, 1980.
5. Tyler, 'Carr and Latham's Technology of Clothing Manufacturing', Blackwell.
6. Jones, Richard M., 'Apparel Industry', 2nd Edn., Blackwell.
7. Chuter, 'Introduction to Clothing Production Management', Blackwell.

MODERN TECHNOLOGY OF FABRIC AND APPAREL PRODUCTION

Subject Code: MFTE1-102

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To introduce various terms and techniques related to fabric and garment production, etc.

UNIT-I

Classification of non-woven fabrics. A survey of non-woven field – its uses and future growth. Principles of web formation. Properties of different type of webs.

Fibre properties and their influence on properties of non-woven fabrics. Web geometry – fibre orientation, curl-factor and web density their effect on properties of non-woven fabrics. Classification of binders and methods of binder application. Binder properties and effect of binder-fibre adhesion on properties of non-woven fabrics.

Needle Bonded Nonwovens: processing variables and their effects on properties.

Stitch bonded fabrics, their manufacture and properties. Spun bonded and split film fabrics.

UNIT-II

Knitting: Manufacturing of single jersey, rib, purl and interlock weft knit fabrics. Properties of these fabrics. Manufacturing of Tricot and Raschel fabrics and properties of these fabrics.

UNIT-III

Narrow Woven Fabrics: Manufacturing of Narrow woven fabrics, Braids, Ribbons, Tapes, Elastic webs, and other type of non-woven fabrics, Properties and application of narrow woven fabrics.

Nets and Laces: Manufacturing techniques of Nets and Laces, their properties and end-uses

UNIT-IV

Modern Apparel Production: Modern marker planning, Spreading, cutting, sewing, pressing and delivery techniques. Different types of Software used for modern apparel production techniques.

Recommended Books

1. Jacob Solinger, 'Apparel Manufacturing Handbook', Van Nostrand Reinhold Company, 1980.
2. Tyler, 'Carr and Latham's Technology of Clothing Manufacturing', Blackwell.
3. Jones, Richard M., 'Apparel Industry', 2nd Edn., Blackwell.
4. Chuter, 'Introduction to Clothing Production Management', Blackwell.
5. Radko Krecma, 'Nonwoven Textiles'.
6. S. Russels, 'Handbook of Nonwovens'.
7. D.J. Spencer, 'Knitting Technology'.
8. D.B. Ajgaonkar, 'Knitting Technology'.

ADVANCED TEXTILE & GARMENT DESIGNING CONCEPTS

Subject Code: MFTE1-103

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives

To impart knowledge of designing concepts of fabric and apparels, etc.

UNIT-I

Fashion Design Fundamentals: Basic concept of design, elements of art, of design: Definition of line shape, form size, space, texture and colour. Structural and decorative dress designing, creating varieties through designs. Principles of Design: Definition Harmony, Proportion, Balance, Rhythm, Emphasis, meaning types and application on apparel psychology of clothing.

UNIT-II

Anatomy for Designers: Effect of Human proportion and figure construction on garment construction. Methods of determining individual proportions. Aesthetic requirement of dress, sensory factors affecting aesthetics. Display of fashion materials: Definition and importance, source techniques and window display, classic fashion shows. Important fashion centers of the world and India.

UNIT-III

Advance fabric dyeing, printing and other surface ornamentation techniques: Resist printing, Ikat – tie and dye, mélange dyeing another painting medium. Knots. Towels: Tie-towels, basin towels, bath towels designing. Quilt designing, Wadding, geometrical ornamentation techniques: Bed-sheet designing: Bed-sheet fabric, designing, cut and spread techniques, pillows/cushion covers designing, appliqué designing.

UNIT-IV

Advanced Pattern Engineering of men's, women's and kid's wear. Geometrical Principles of Apparel construction: Simple shapes, triangle, bell and balloon, complex shapes and combining techniques, wrapping and tying techniques, pleats and flares to control fullness. Latest Ornamental techniques in garment designing.

Recommended Books

1. Erwin Model, 'Clothing for Moderns', Mac Millan Publications, New York.
2. Tate and Sharon Lee, 'Inside Fashion Design', Harper Publication Inc., U. Kng.
3. Navneet Kaur, 'Comdex Fashion Design; Fashion Concepts', Vol –I, Dreamtech Press, 2010.
4. N. Gokarneshan, 'Fabric Structure and Design', New Age Publishers
5. Z.J. Groszicki, 'Watson Textile Design and Colour', Newnes Butterworth.
6. Nisbet H, 'Grammar of Textile Design', D.B. Tarapore Wala Sons and Co.

APPAREL TESTING AND QUALITY CHARACTERIZATION

Subject Code: MFTE1-104

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives

To impart knowledge of Testing and quality evaluation of fabrics and apparels, etc.

Unit-I

Introduction: Aim and scope of testing, Sample and Population, Sampling techniques. Fibre, yarn and fabric testing concepts, instruments and applications. Fabric comfort properties: water-vapour transmission through fabrics, Wicking properties, Air permeability and wettability. Fabric composition testing, fabric chemical testing.

Unit-II

Overview of low stress mechanical properties, FAST, Kawabatta Evaluation System. Analysis of KES, FAST data.

Garment testing concepts, instruments and applications: dimensions, seam strength, seam slippage, adhesion between interlining and fabric, shrinkage, zippers, buttons, snap fasteners and other general garment properties. Needle cutting/yarn severance.

Unit-III

Testing of specially designed fabrics and finishes: Flame resistance, Water repellency, etc. Computer colour matching: concept of colour measurement and applications. Different fastness (light, washing, perspiration, sublimation, chlorine, etc.) properties and their evaluation.

Unit-IV

International quality parameters and various standards such as AATCC, SDC, ASTM, etc. Salient features of different testing protocols for apparels, various essential standards and regulations associated with quality evaluation of apparels, safety aspects of children's apparel, quality program of clothing sector, the role of retailer, agent, vendor and laboratory.

Recommended Books

1. B.P. Saville, 'Physical Testing of Textiles', Woodhead Publishing Ltd, Cambridge, 2002.
2. V.K. Kothari, 'Testing and Quality Management', IAFL Publications, New Delhi, 1999.
3. J.E. Booth, 'Principles of Textile Testing', CBS Publishers and Distributors, New Delhi, 1999.
4. P. Angappan & R. Gopalakrishnan, 'Textile Testing', SSM Institute of Textile Technology, Komarapalayam, 2002.
5. V.K. Mehta, 'Apparel Quality Control'.
6. A. Basu, 'Textile Testing', SITRA Coimbatore, 2002.

GARMENT DEVELOPMENT LAB.-I

Subject Code: MFTE1-105

L T P C

0 0 4 2

Course Objectives

To practice developing different types of garments, etc.

Introduction and application of different aids, tools and equipment required in garment construction. Flat pattern technique: drafting, developing pattern. Drafting of child basic and adult bodice blocks. Drafting of collars and sleeves.

Preparation and construction of different types of seams, necklines, plackets, pockets, pleats and tucks. Dart manipulation and their applications.

TEXTILE AND APPAREL TESTING LAB.

Subject Code: MFTE1-106

L T P C

0 0 4 2

Course Objectives

To practice testing and evaluating different types of quality parameters of textile fabrics and garments, etc.

Applications of chemicals, dyes and functional finishes to make speciality garments and their evaluation. Fabric composition testing. Fabric shrinkage, Air-permeability, Limited Oxygen Index (LOI), flammability test, Water absorbency, Water repellency, Hydrostatic water proof test, Abrasion Resistance: flat and flex, Pilling resistance.

Fabric composition testing, fabric chemical testing, testing for fabric comfort. Determination light, washing, perspiration, sublimation, chlorine, etc. fastness properties of dyed samples.

Seam strength, Seam Slippage, Adhesion between interlining and fabric, shrinkage, zippers, buttons, snap fasteners and other general garment properties.

INDEPENDENT STUDY

Subject Code: MFTE1-107

L T P C

0 0 4 2

Course Objectives

To study and practice developing fabrics and garments depending upon individual study and research, etc.

Student has to study the particular topic as per their interest/ requirement of the project or suggested by the faculty under supervision.

FASHION DESIGN CONCEPTS

Subject Code: MFTE1-156

L T P C

3 1 0 4

Duration: 45 Hrs.

Course Objectives

To impart knowledge of fashion, design concepts, etc.

Unit-I

Fashion terminology, cycle, influence, fashion: Introduction to fashion and apparel design. Origin of fashion, concept, analysis, trends and creations. Fashion Theories: Fashion of different eras. fashion promotion, style-fad-trends.

Unit-II

Fashion Design fundamentals: Basic concept of design, elements of art, of design: Definition of line shape, form size, space, texture and colour. Structural and decorative dress designing, creating varieties through designs.

Principles of Design: Definition Harmony, Proportion, Balance, Rhythm, Emphasis, meaning types and application on apparel psychology of clothing.

Unit-III

Introduction to colours and their theories. Colour harmony and colour contrast, modification of colours. Principle of colour measurement. Effect of colours on garment construction. Arrangement of figures such as unit repeating design, the drop device, drop reverse design, etc.

Unit-IV

Anatomy for designers: Effect of Human proportion and figure construction on garment construction. Methods of determining individual proportions. Aesthetic requirement of dress, sensory factors affecting aesthetics.

Display of fashion materials: Definition and importance, source techniques and window display, classic fashion shows. Important fashion centers of the world and India.

Recommended Books

1. Erwin Model, 'Clothing for Moderns', Mac Millan Publications, New York.
2. Tate and Sharon Lee, 'Inside Fashion Design', Harper Publication Inc., U. Kng.

HIGH PERFORMANCE FIBRES

Subject Code: MFTE1-157

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of fibres, high performance fibres, etc.

Unit-I

Introduction to fibres, their classification, important fibre properties. Natural fibres such as cotton, jute, wool, silk, etc., physical and chemical properties with applications. Advancement in production/cultivation of natural fibres such as BT cotton and their impact on ecology.

Unit-II

General definition of man-made or manufactured fibres, introduction to general principles of spinning and spinning processes. Basic principles of fibre spinning, Spinning processes: Melt spinning. High speed spinning, spinning of microfibre, solution spinning process: Dry and wet spinning. Manufacture and specifications of raw materials and monomers. Heat-setting of fibres.

Unit-III

Regenerated Fibres: Viscose, Liocel, high tenacity regenerated fibres, regenerated protein fibres, their methods of manufacture, physical & chemical properties and applications.

Synthetic fibres: nylon 6 and 66, PET, PAN, their methods of manufacture, physical & chemical properties and applications.

Unit-IV

High Performance Fibres: Introduction to PU, PTFE, Aramide, carbon fibre, etc. their methods of manufacture, physical & chemical properties and applications. Brief idea on microdenier, bicomponent, hollow fibres and other developments in fibres.

Recommended Books

1. A.A. Vaidya, 'Production of Synthetic Fibres', 1st Edn., Prentice Hall of India, New Delhi, 1988.
2. V.B. Gupta and V.K. Kothari, 'Manufactured Fibre Technology', 1st Edn., Chapman and Hall, London, 1997.
3. H.F. Mark, S.M. Atlas and E. Cernia, 'Man Made Fibre Science and Technology', Vol. 1, 2, 3, 1st Edn., Wiley Inter Science Publishers, New York, 1967.
4. J.E. Macintyre, 'Synthetic Fibres', Woodhead Fibre Science Series, UK, 2003.
5. F. Fourne, 'Synthetic Fibres: Machines and Equipment, Manufacture, Properties', Hanser Publisher, Munich, 1999.

THEORY AND DESIGN OF GARMENT MACHINERY

Subject Code: MFTE1-158

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of garment machineries, etc.

Unit-I

Theory, measurement and control of yarn tension in unwinding from sewing thread packages during Sewing. Study of stitch formation during sewing operation. Relationship between sewing speed and stitches per inch on stitch formation. Stitch types and stitch geometry.: Various types of stitch types produced on different types of sewing machines. Properties of stitches and their

usefulness.

Unit-II

Seam Types and Seam Geometry: Various types of seams and their geometry. Application of different seams in producing different garments.

Feed Mechanisms: Different types of sewing feed mechanisms and their uses Control of differential feed.

Unit-III

Development in design and operation of modern sewing machines. Theory and design principles of latest automatic controls in stitch regulation in sewing.

Kinematics of drop feed mechanism. Design problems of conventional sewing machines.

Unit-IV

Principles Underlying Unorthodox Sewing Machinery System: Microprocessor and computer controls, Specialty sewing machines and their Kinematics.

Timings for sewing operations for needle and looper systems.

Recommended Books

1. Jacob Solinger, 'Apparel Manufacturing Handbook', Van Nostrand Reinhold Company, 1980.
2. Tyler, 'Carr and Latham's Technology of Clothing Manufacturing', Blackwell.
3. Jones, Richard M., 'Apparel Industry', 2nd Edn., Blackwell.
4. Chuter, 'Introduction to Clothing Production Management', Blackwell.

FABRIC PROPERTIES AND TEXTILE DESIGNING

Subject Code: MFTE1-159

L T P C

Duration: 45 Hrs.

3 1 0 4

Course Objectives

To impart knowledge of fabric and Textile Designing, etc.

Unit-I

Fabric formation technologies, Fabric properties-dimensional & structural, Mechanical, Comfort related properties, Low stress mechanical properties, properties related to aesthetic significance, other physical properties relevant to end use, Influence of fibres, yarn characteristics and fabric construction parameter on clothing comfort.

Unit-II

Concept of fabric designing through fabric structure, Importance of fabric structure, Basic Weaves: Plain, Twill, Sateen weaves, Theirs derivatives and ornamentation, Draft and Peg-plan for all simple weave. Other decorative weaves like Diamond, Mockleno, Corkscrew, Honey Comb, Huck-a-back, etc.

Unit-III

Knitting, comparison of knitting and weaving technology, Classification of knitting. Difference between woven and knitted fabric properties., Characteristics of warp knit and weft knit structure.

Knitting Elements: Knitting needles, sinkers, cam systems, etc. Knitting cycles, Weft knitting: properties and uses of basic weft knitted structures- Plain, Rib, Interlock and Purl.

Unit-IV

Fundamental Stitches: Knit, Tuck and float stitches and their uses. Ornamentation of knitted fabrics. Concept of loop length, production calculation,

Calculations for Tightness factor, fabric cover, stitch density, areal density and knitting machine production.

Recommended Books

1. Sabit Adanur, 'Handbook of Weaving', Technomic Publishing Company, Inc, U.S.A.
2. N. Gokarneshan, 'Fabric Structure and Design', New Age International, N. Delhi.
3. Azgaonkar, 'Knitting Technology', Universal Publishing Corp.

STRUCTURE AND PROPERTIES OF FIBRES

Subject Code: MFTE1-160

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives

To impart knowledge of fibres and their properties, etc.

Unit-I

Structure of Fibres: Traditional view of fibre structure, Methods of investigation of fibre structure, Introductory idea about identification of chemical and physical structure by IR spectroscopy, X-ray, SEM.

Unit-II

Moisture Absorption: Fundamentals of moisture like humidity, Moisture regain and content, relation, equilibrium, Heat of sorption, swelling of fibres, factors influencing results of tensile experiment, creep and stress relaxation

Unit-III

Introduction to dielectric properties and static electricity, Measurement of static electricity, Optical properties: Refractive index and birefringence, Birefringence and orientation of fibres, reflection and lustre.

Unit-IV

Introduction to thermal Properties and fibre friction, technological importance, measurement of friction, Effect of load and area of contact, static and kinetic friction. General theory of friction and application to fibres.

Recommended Books

1. R. Meredith, 'The Mechanical Properties of Textile Fibres', North Holland Publishing Co.
2. W.E. Morton and J.W.S. Hearle, 'Physical Properties of Textile Fibres', The Textile Institute, UK.
3. V.B. Gupta and V.K. Kothari, 'Manufactured Fibre Technology', Chapman and Hall, London.

DEVELOPMENTS IN SPECIALTY YARNS & TEXTURING

Subject Code: MFTE1-208

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives

To introduce specialty yarns and texturing.

Unit-I

Types of Specialty Yarns: Novelty yarns, Grindle yarns, core-spun yarns, Chennile yarns, Corded yarns, Bulky yarns and other types of specialty yarns. Methods of production of novelty yarns, their properties and applications

Unit-II

Sewing Threads: Their manufacturing techniques, special finishes, properties and end-uses

Unit-III

Different Types of Texturing: Twist texturing, Air-jet texturing, edge crimping stuffer box crimping, gear crimping, knit-de-knit etc.

Detailed discussion on False Twist. texturing process, machine. Material, process and machine variables – their effect on properties of yarn. Recent developments.

Unit-IV

Air-jet Texturing: Detailed discussion of process. Different types of variables and their effect on properties of yarn. Recent developments of air-jet texturing machine, jets and process.

Methods of assessing and evaluation of textured yarns. Hi-bulk yarns – especially acrylic. Chemical texturing.

Recommended Books

1. A. Venkatasubramani, 'Spun Yarn Technology'.
2. Allan Fellingham, 'Air-jet Texturing'.
3. J. Hearle, L Hollick and D. Wilson, 'Yarn Texturing Technology'.
4. A. Laura and J. Bryant, 'Knitting with Novelty Yarn'.
5. Ali Demir, 'Synthetic Filament Yarn: Texturing Technology'.

FUNCTIONAL TEXTILES & GARMENTS – I

Subject Code: MFTE1-209

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To introduce various terms and techniques related to functional textiles and garments production and properties, etc.

UNIT- I

Introduction to functional garment and their applications. Medical Textiles: application of various polymers and textile materials in medical field such as artificial tandem and alignments, kidney, heart, surgical product, cardiovascular graft, sterilization, wound care, etc.

UNIT-II

Nanotechnology in apparels - Introduction and Definition of Nanotechnology. Understanding Nanotechnology. Nanotechnology and Today's World. Use of nanotechnology in the field of fibres and polymers and their application in apparels. Latest developments of nanomaterials in garment sectors.

UNIT-III

Protective clothing - Brief idea about different type of protective clothing, General requirement of protective clothing, cut resistant fabric, chemical protective clothing (CPC) - Areas of use, CPC items for air-born, liquid hazard, different chemicals used, parts of CPC, performance evaluation – permeation, solubility and diffusion theory, barrier effectiveness, structural integrity, water proof breathable fabrics.

UNIT-IV

Ballistic Protective clothing – Requirements, principle of mechanism, different fibres and fabrics, soft and hard armor, factors influencing performance.

Thermal Protective Clothing (TPC)– Combustion mechanism, fire governing parameters, Requirements, Designing of TPC, Construction, various parameters affecting flame retardancy, performance evaluation,

Pesticide Protective Clothing – Requirements of protective clothing, different areas, different parts of PPC, Performance evaluation of PPC.

Recommended Books

1. R. Shishoo, 'Textiles in Sport', Woodhead Publisher.
2. X.M. Tao, 'Wearable Electronics and Photonics', Woodhead Publisher.
3. S. Adanur, 'Wellington Sears Handbook of Industrial Textiles', Woodhead Publisher.
4. A.R. Horrocks and S.C. Anand, 'Handbook of Technical Textiles', UK.
5. P. Brown and K. Stevens, 'Nanofibres and Nanotechnology in Textiles', Woodhead Publisher.
6. Y. Li, 'Nanofunctional Textiles and their Applications', Woodhead Publisher.
7. L Van Langenhove, 'Smart Textile for Medical and Healthcare', Woodhead Publisher.

FUNCTIONAL FINISHES OF GARMENTS

Subject Code: MFTE1-210

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of designing concepts of fabric and apparels, etc.

UNIT-I

Introduction to textile finishing. Aim and scope. Classification of finishes. Concept of permanent and temporary finishes. Various finishes in industrial practices such as raising and shearing, drying. Calendaring - its types, construction and function of various calendaring m/cs. Sanforizing – method and mechanism.

UNIT-II

Brief concept of finishing of wool: Crabbing, decatizing, milling, shrink finishing, etc. General chemical finishes like softening, stiffening, delustering of rayon, polyester. organdy finish. Silky finish of polyester/ weight reduction of polyeste. Weighting of silk. Heat setting of synthetic fibres, concept and required machines.

UNIT-III

Introduction and preliminary concepts of specialty finishes such as durable press finish to textile and garments, anti-crease finish. Water repellent and water proof finish: concept, mechanism and their application. Flame-proof and flame-retardant finish: concept, mechanism and their application.

UNIT-IV

Introduction and preliminary concepts of specialty finishes such as Soil and oil repellent finish, anti-static finish, antimicrobial finish. Introduction to enzymes and their applications in finishing of textiles and garments. Finishing of denim: stone wash, enzyme wash, etc. enzyme wash and some other specialty finishes. UV protective finishes. Brief introduction and application of nanofinish, ultrasound, Laser, plasma Technology in textiles.

Recommended Books

1. E.P.G. Gohl and L.D. Vilensky, 'Textile Science', CBS Publishers.
2. J.T. Marsh, 'An Introduction to Textile Finishing'.
3. V.A. Shenai, 'Textile Finishing'.
4. J.N. Chakarverty, 'Fundamental and Practices in Colouration of Textiles'.

ADVANCES IN APPAREL TECHNOLOGY

Subject Code: MFTE1-211

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of advancements in apparel technology, etc.

Unit-I

Innovation in seams, stitches, sewing thread, needles, marker, planning and cutting technology. Understanding the need and use of various construction types for sewing machinery in regards to quality and performance improvement and ease to operate,

Unit-II

Advancement in Sewing Machinery: Directive for operating special purpose sewing machinery. Various bed types of machine and their applications in manufacturing processes: Flat Bed, large area Raised Bed, DNLS m/c, Over Lock m/c, Flat Lock m/c, Multi thread Chain Stitch m/c, Blind stitch machine and their developments.

Unit-III

Various types of feed mechanisms, their suitability for different fabrics and construction of components and their contribution towards quality and productivity. Application of programmable machines in garment industries. Developments and automation in garment manufacturing machines and industries.

Unit-IV

Scientific approach in sewing techniques. Ergonomic concepts and application in the sewing room, Introduction of time targets and quality aspects, Practical approach to achieve targets, understanding of different shaped sewing lines in actual garments, Material Handling, Postural Techniques, Work Study, Working Time Arrangement, Shift Work, Motion Economy, anthropometric, Basic Sewing Patterns, Convex sewing pattern, Curved sewing pattern, Angular sewing pattern, etc.

Recommended Books

1. 'Knitted Clothing Technology', Brackenburry.
2. Harold Carr, Barbara Latham, 'The Technology of Clothing Manufacture'.
3. Gerry Cooklin, 'Introduction to Clothing Manufacture'.

PRODUCTION PLANNING & OPERATION MANAGEMENT

Subject Code: MFTE1-261

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of production planning of apparel manufacturing & Operation management, etc.

Unit-I

Basic concept of production & operation, Macro and micro level planning with special reference to apparel industry, Production scheduling & control, PERT/CPM.

Unit-II

Application of Industrial Engineering in Apparel industry. Method of conducting Work study, Time study and method study with special reference to apparel industry. Ergonomics in garment industry.

Unit-III

Management Information system. Concept of ERP and its application.

Unit-IV

Social accountability and its impact. Implementation of SA-8000 in Industry.

Recommended Books

1. N.G. Nair, 'Production and Operation Management'.
2. S.N. Charry, 'Production and Operation Management'.
3. K.C. Batra, 'Production Management'.
4. E. Adams, 'Production and Operation Management'.
5. 'Concept, Model and Behaviour'.
6. Martland Telsang, 'Industrial Engineering & Production Management'.

TECHNICAL TEXTILES AND SMART GARMENTS

Subject Code: MFTE1-262

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of Technical Textiles and Smart garments, etc.

Unit-I

Introduction: Definition, Textile materials in technical applications.

Fibres: Natural and Man-made fibres suitable for technical applications and their relevant properties.

Unit-II

Geotextiles: Mechanics of reinforcement, filtration and drainage of soils by geotextiles. Typical applications. Determination of soil particle size and pore size distribution, relations between soil particle and size and pore size distribution for hydraulic applications.

Unit III

Medical Textiles: Textiles in various medical applications. Absorbency of textile materials & methods of sterilization; application oriented design of typical medical textiles (e.g. porous graft or trashed tube). Materials used and design procedure for protecting wounds, cardiovascular application, Sutures etc. Automotive Textiles: Fibres used for automotive applications- upholstery, carpeting, preformed parts, tyres, safety devices, filters and engine compartment items. Brief description for the manufacture and application of these devices or parts.

Unit-IV

Rigid Composites: Three dimensional fabrics and triaxially braided materials for composites. Filtration: Principles and some mathematical models of wet and dry filtrations. Characteristics properties of fibres and fabrics in selective examples of filtration. Ropes and Cordages: Methods of production. Application oriented structure and production of ropes, cordages and twines. Intelligent & Smart garments, Sportswear, Leisurewear, swimwear, Spacesuits. Protective clothing: Thermal protection. Ballistic protection. Protection from electromagnetic radiation and static hazards. Protection against micro-organisms, chemicals.

Recommended Books

1. W. Fung, 'Coated and Laminated Textiles'.
2. A.R. Horrocks and S.C. Anand, 'Handbook of Technical Textiles'.
3. W. Fung and J.M. Hardcastle, 'Textiles in Automotive Engineering'.

4. X.M. Tao, 'Smart Fibres, Fabrics and Clothing'.
5. R.A. Scott, 'Textiles for Protection'.
6. R. Shishoo, 'Textiles in Sport'.
7. X.M. Tao, 'Wearable Electronics and Photonics'.

ENVIRONMENT MANAGEMENT & ECO-FRIENDLY TEXTILES

Subject Code: MFTE1-263

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of Environment management and Eco-friendly textiles, etc.

Unit-I

Concept of environment management and its importance in manufacturing industry. Sources of various kinds of pollution in textile & apparel industry.

Unit-II

Assessment of environmental impact and designing of environmental management program. Environment audit.

Unit-III

Air, water and noise pollution. Disposal of waste and effluents and related processes. Standard norms for effluent emissions in textile & apparel industry.

Unit-IV

Occupational, health and safety management.

Eco-friendly chemical processing, Natural dyes, Eco standards and their applications.

Eco-friendly Textiles: Organic cotton & wool- their production and processes

Recommended Books

1. A.R. Horrocks, 'Recycling Textile and Plastic Waste'.
2. A.R. Horrocks, 'Eco-textile 98'.
3. K. Slater, 'Environmental Impact of Textiles'.
4. Y. Wang, 'Recycling in Textiles'.
5. Y. Li and A.S. Wong, 'Clothing Biosensory Engineering'.
6. Y. Li, 'Biomedical Engineering of Textiles and Clothing'.
7. R.S. Blackburn, 'Biodegradable and Sustainable Fibres'.

MODERN METHODS OF MERCHANDISING & MANAGEMENT

Subject Code: MFTE1-264

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of Merchandising and management, etc.

Unit-I

Retailing Environment: Introduction to Retailing, Types of Retailing, Multi-channel Retailing, Retailing Strategy: Retail Audit, Retail Customer, Retail/Site Selection, Retail Organization and Human Resource Management, Customer Relationship Management, Pricing in Retailing, Retail Communication.

Unit-II

Merchandise Management: Developing and Implementing Merchandise Plans, Financial Management, Operations Management, Supply chain management.

Unit-III

Store Management: Store Layout, Design and Visual Merchandising, Customer Service

Unit-IV

Fashion Communications: Fashion shows, Portfolio, Mood board, Story board, Flat sketches, colour chart, Forecasting: Colour forecasting, Fabric forecasting, Fashion advertising, Fashion photography

Recommended Books

1. Levy and Weitz, 'Introduction to the World of Retailing', Berman and Evans.
2. Levy and Weitz, 'Retail Institutions and Multi-channel', Berman and Evans. ;
3. 'Strategic Planning in Retailing', Berman and Evans.
4. Levy and Weitz, 'Retail Market Strategy'.
5. 'Identifying and Understanding Consumers', Berman and Evans.
6. Levy and Weitz, 'Customer Buying Behavior'.
7. Levy and Weitz, 'Store Layout, Design and Visual Merchandising'.
8. 'Retail Image and Promotional Strategy', Berman and Evans.
9. Levy and Weitz, 'Pricing', Berman and Evans.

GARMENT DEVELOPMENT LAB.-II

Subject Code: MFTE1-212

L T P C

0 0 4 2

Course Objectives

To practice developing different types of garments, etc.

Construction of garment of children, men and women wear.

Techniques of draping and grading, their applications in dress construction. Line balancing system. Practice of pattern making and construction of selected kids, ladies and gents wear. Preparation functional/Specialty garment.

SOFTWARE PACKAGES LAB.

Subject Code: MFTE1-213

L T P C

0 0 4 2

Course Objectives

To practice application of tools and software packages related to pattern making and designing of textile fabrics and garments, etc.

Study and application of tools and software packages related to the topic and discipline of the study and department. Pattern making, grading and marker making and designing software's in Fashion and Technology.

INDEPENDENT STUDY

Subject Code: MFTE1-214

L T P C

0 0 4 2

Course Objectives

To study and practice developing fabrics and garments depending upon individual study and research, etc.

Student has to study the particular topic as per their interest/requirement of the project or suggested by the faculty under supervision.

RESEARCH METHODOLOGY

Subject Code: MREM0-101

L T P C

Duration: 45 hrs.

4 0 0 4

UNIT-I (11 Hrs.)

Introduction to Research: Meaning, Definition, Objective and Process

Research Design: Meaning, Types - Historical, Descriptive, Exploratory and Experimental

Research Problem: Necessity of Defined Problem, Problem Formulation, Understanding of Problem, Review of Literature

Design of Experiment: Basic Principal of Experimental Design, Randomized Block, Completely Randomized Block, Latin Square, Factorial Design.

Hypothesis: Types, Formulation of Hypothesis, Feasibility, Preparation and Presentation of Research Proposal

UNIT-II (10 Hrs.)

Sources of Data: Primary and Secondary, Validation of Data

Data Collection Methods: Questionnaire Designing, Construction

Sampling Design & Techniques – Probability Sampling and Non Probability Sampling

Scaling Techniques: Meaning & Types

Reliability: Test – Retest Reliability, Alternative Form Reliability, Internal Comparison Reliability and Scorer Reliability

Validity: Content Validity, Criterion Related Validity and Construct Validity

UNIT-III (13 Hrs.)

Data Process Operations: Editing, Sorting, Coding, Classification and Tabulation

Analysis of Data: Statistical Measure and Their Significance, Central Tendency, Dispersion, Correlation: Linear and Partial, Regression: Simple and Multiple Regression, Skewness, Time series Analysis, Index Number

Testing of Hypothesis: T-test, Z- test, Chi Square, F-test, ANOVA

UNIT – IV (11 Hrs.)

Multivariate Analysis: Factor Analysis, Discriminant Analysis, Cluster Analysis, Conjoint Analysis, Multi-Dimensional Scaling

Report Writing: Essentials of Report Writing, Report Format

Statistical Software: Application of Statistical Soft wares like SPSS, MS Excel, Mini Tab or MATLAB Software in Data Analysis

**Each Student has to Prepare Mini Research Project on Topic/ Area of their Choice and Make Presentation. The Report Should Consists of Applications of Tests and Techniques Mentioned in The Above UNITs*

Recommended Books

1. R.I. Levin and D.S. Rubin, 'Statistics for Management', 7th Edn., Pearson Education, New Delhi.
2. N.K. Malhotra, 'Marketing Research–An Applied Orientation', 4th Edn., Pearson Education, New Delhi.
3. Donald Cooper, 'Business Research Methods', Tata McGraw Hill, New Delhi.
4. Sadhu Singh, 'Research Methodology in Social Sciences', Himalaya Publishers.
5. Darren George & Paul Mallery, 'SPSS for Windows Step by Step', Pearson Education, New Delhi.
6. C.R. Kothari, 'Research Methodology Methods & Techniques', 2nd Edn., New Age International Publishers.

AUTOMATION OF APPAREL PRODUCTION

Subject Code: MFTE1-366

L T P C

Duration: 45 Hrs.

3 1 0 4

Course Objectives

To introduce various terms and techniques related to automation in garments production, etc.

Unit-I

Concept of Automation: Base subject information, basic terms and definitions from mechanization area and automation area. Energy transfer in kinematic system, drive requests, types of drives, comparison, characteristics, fluid drives, characteristics, comparing, pneumatic drives, air properties as a medium for energy transfer. Hydraulic drives, schematic diagram, power packs, Proportional hydraulic system, servo-operated valves, circuits with PAS (power assisted steering). Electric drives, general view, characteristics, powers (outputs).

Unit-II

Automated elements in cutting of textile materials, cutting by water jet. Automated elements in clothing production- sewing and ironing process.

Unit-III

Overview of conceptions of "Work Robots" and "Manipulators". Kinematic of configurations, kinematic couples, application in textile and clothing industry, Effectors of "Work Robots" and "Manipulators", Vacuum grippers, control grippers, and special grippers of gripping of textile materials.

Unit-IV

Types of driving mechanism of sewing machines, automated sewing machines. Automation in area of handling and manipulation with textile material in clothing process. Conveyor systems.

Recommended Books

1. G.A. Berkstresser & E.M. Buchanan, 'Automation and Robotics in the Textile and Apparel Industries'.
2. H. Carr and B. Latham, 'The Technology of Clothing Manufacture'.
3. C.Y. Cheng and S.F. Yip, 'Introduction to Garment Manufacture'.
4. K.P. Lau, et al., 'Garment Manufacture - Basic Sewing Technology'.
5. G. Cooklin, 'Fusing Technology'.

6. N. Relis & G. Strauss, 'Sewing for Fashion Design'.
7. G. Stylios, 'Textile Objective Measurement and Automation in Garment Manufacture'.
8. J. Solinger, 'Apparel Manufacturing Handbook'.
9. R.J. Crum, 'Methods of Joining Fabrics'.

APPAREL PRODUCTION CAD/CAM SYSTEMS

Subject Code: MFTE1-367

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of CAD/CAM systems in apparel production technology, etc.

Unit-I

Application of company information systems, ERP, PLM systems and a engineering methods (JIT, MRP, TOC) in aid of control and company process planning ERP system Helios Orange by LSC International.

Unit-II

Control and company process planning by means of CIM, General principles of CA (computer aided) systems.

I. (CAD, CAE, CAP), Formats of video date storage, Data interchange among CA systems General principles of CA systems.

II. (CAM, CAD/CAM, CQM)

Unit-III

Application of CA technology in clothing production I. - point of software view Application of CA technology in clothing production II. - point of hardware view (principles of digitizer, plotter, scanner, cutter).

Unit-IV

Systems for 2D and 3D clothes designing - data communication between 2D CAD AccuMark system and 3D V-Stitcher, evaluation of clothes fitting to body, creation of virtual presentation. Body scanners - MaNescan system, MIT_MaNescan program, procedure for measuring and evaluation by 3D CAD CATIA program, application of these programs for production of made to order clothes Automatic contactless data capture in clothing production - application of RFID and bar codes.

Recommended Books

1. G.A. Berkstresser & Buchanan, 'Automation and Robotics in the Textile and Apparel Industries'.
2. H. Carr and B. Latham, 'The Technology of Clothing Manufacture'.
3. C.Y. Cheng and S.F. Yip, 'Introduction to Garment Manufacture'.
4. K.P. Lau, et al., 'Garment Manufacture - Basic Sewing Technology'.
5. N. Relis & G. Strauss, 'Sewing for Fashion Design'.
6. G. Stylios, 'Textile Objective Measurement and Automation in Garment Manufacture'.
7. J. Solinger, 'Apparel Manufacturing Handbook'.
8. Stephen Gray, 'CAD / CAM in clothing and Textiles'.
9. W. Aldrich, 'CAD in clothing and Textiles'.

COMPUTER AIDED PATTERN DESIGN

Subject Code: MFTE1-368

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of pattern design using CAD systems, etc.

Unit-I

Advanced 3D pattern design systems. Application of the MTM method (Made To Measure) for the production of individual and personalized garments.

Unit-II

Pattern modification for garment size and fit. A Good basic understanding of the variation in figure shapes and the appropriate pattern modification. Pattern alteration according to the wearer's; bone structure, posture, body size and contour. Measurement pattern deformation. Choosing the material from a pre-defined library and defining your mechanical properties of fabrics for simulation.

Unit-III

Theory of design procedures for the automated design of garments using the CAD system PDS Tailor XQ. Using CAD technology for customization. Design Concept - software for developing templates from 3D shapes. Production of 2D templates from 3D designs for prototyping. The rational way to design clothes and the transition from 2D to 3D images of virtual body.

Unit-IV

Computer Graphics - theory, input and output devices, applications, product development. The principle of scanning the surface of the human body using a system MaNescan. Flattening the surface of 3D objects and their applications in the flattening human body surface in a 3D CAD program CATIA.

Recommended Books

1. Alison Beazley and Terry Bond, 'Computer-Aided Pattern Design and Product Development'.
2. Sandra Burke, 'Fashion Computing: Design Techniques and CAD'.
3. Stephen Gray, 'CAD / CAM in clothing and Textiles'.
4. W. Aldrich, 'CAD in clothing and Textiles'.
5. 'Computer Aided Design', Gerber Technology.
6. 'Modaris, Diamino and Justprint for Apparel Design'.

UTILITY PROPERTIES OF CLOTH AND APPARELS

Subject Code: MFTE1-369

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Course Objectives

To impart knowledge of utility properties of textile and apparels, etc.

Unit-I

Characteristics of clothing materials, according to the function of a clothing product. Classification of clothing materials. Clothing materials demands for users and garments producers.

Unit-II

CSN, ISO standards for evaluation of clothing materials and garments.

Processing properties of clothing materials. Processing and utility properties of sewing threads evaluating methods

Unit-III

End-use properties- clothing materials durability, evaluative methods, Extent of care for garments

End-use properties- aesthetic properties of clothing materials, evaluative methods

End-use properties- Physiological properties of clothing materials, evaluative methods

Unit-IV

Clothing comfort, apparent temperatures.

Hand evaluation – subjective and objective methods of hand evaluation

End-use properties- Special properties of clothing materials for extreme conditions, evaluative methods.

Multifunction and semi-permeable clothing materials, Special protective clothing.

Recommended Books

1. Hassan M. Behery, 'Nonwovens-Theory, Process, Performance and Testing'.
2. V.K. Kothari, 'Testing and Quality Management'.
3. P.V. Mehta, 'An Introduction to Quality Control for Apparel Industry'.
4. J. Fan, and L. Hunter, 'Engineering Apparel Fabrics and Garments'.
5. B.P. Saville, 'Physical Testing of Textiles'.
6. 'Fabric Testing', Woodhead Publishers.

SEMINAR ON ADVANCED TOPICS

Subject Code: MFTE1-315

L T P C

0 0 4 2

Course Objectives

To deliver a talk on advanced topic in the form of power point presentation supported by documents like research papers, literatures, etc. To enable a student to be familiar with Communication skills.

Student is expected to learn

- a. How to make a presentation
 - i. Verbal
 - ii. Non Verbal
 - iii. LCD based Power Point
- b. How to write a report
 - i. Abstract
 - ii. Body
 - iii. Conclusions
 - iv. Executive Summary
- c. Group Discussion
 - i. Share the work with a group
 - ii. Modularization of the work
 - iii. Shareware Development
- d. Communication
 - i. Horizontal
 - ii. Vertical

Students will be given a topic of importance and are expected

- a. To present the topic verbally in 30 minutes
- b. To present the topic as a report in 30 pages

MINOR PROJECT

Subject Code: MFTE1-316

L T P C

0 0 4 2

Course Objectives

To make literature survey, research methods, project synopsis of the research project he/she is willing to carry out in the final semester and deliver a talk on the above research work in the form of power point presentation supported by documents like research papers, literatures, etc.

The term work under this, submitted by the student shall include –

1. Work diary maintained by the student and counter signed by his guide.
2. The contents of work diary shall reflect the efforts taken by candidate for
 - (a) Searching the suitable project work
 - (b) Visits to different factories or organizations
 - (c) Brief report of journals and various papers referred
 - (d) Brief report of web sites seen for project work
 - (e) The brief of feasibility studies carried to come to final conclusion
 - (f) Rough sketches
 - (g) Design calculation etc. etc. carried by the student.

The student has to make a presentation in front of panel of experts in addition to guide as decided by department head.

ADVANCED GARMENT DESIGNING AND MAKING OR HOME FASHION LAB.

Subject Code: MFTE1-317

L T P C

0 0 4 2

Course Objectives

To practice developing different types of garments, Home fashion products, etc.

Generation of advanced garments with detailed fashion motivations e.g. Jackets/Coats, Evening gowns, Maternity wear and functional wear e.g. high visibility apparels, multilayered apparels etc.

or

Home fashion

Designing of bedding textiles including bed linens, pillow covers etc. Quilt designing for strip, pieced and painted quilts. Baby mattresses and quilt designing. Towel designing e.g. tie towels, basin towels etc. Curtain designing e.g. cafe, sarong, belly dancers' curtains etc. Hand loom article designing like rugs, bath mats etc.

Note: Students have to make 4-5 garments/products from designed fabrics of their choice. Garments (menswear/womenswear/kidswear)/products should be designed based on themes and seasons as projected by likes of the students, which will be assessed by the jury comprising of external experts from Academic Institution/Industry as well as Internal subject tutor(s). Showcasing of garments or products will be done on Dummies/models/display tables/racks supported by a Technical Report.

DISSERTATION

Subject Code: MFTE1-318

L T P C

0 0 40 20

Course Objectives

To carry out research work, display their work in the form of exhibition/fashion show. The student will submit a synopsis at the beginning of the semester for the approval from the project committee in a specified format. Synopsis must be submitted within two weeks. The first defense, for the dissertation work, should be held within two months' time. Dissertation Report must be submitted in a specified format to the project committee for evaluation purpose at the end of semester. Students should develop garments or Home Fashion products based on fashion trends/forecasting, using moodboard, storyboard and showcase their final products in the form of fashion show and exhibition supported by documents including Portfolio, Swatch book, colourboard, moodboard, storyboard and hard bound project thesis.

MRSPTU

**MRSPTU M.Sc. (FOOD TECHNOLOGY) SYLLABUS 2018 BATCH ONWARDS
UPDATED ON 21.4.2018**

Semester 1 st		Contact Hrs...			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFOT1-101	Principles of Food Preservation	3	1	0	40	60	100	4
MFOT1-102	Basic Food Microbiology	3	1	0	40	60	100	4
MFOT1-103	Food Chemistry	3	1	0	40	60	100	4
MFOT1-104	Food Analysis and Instrumentation Lab.-I	0	0	4	60	40	100	2
MFOT1-105	Food Microbiology Lab.-II	0	0	4	60	40	100	2
Departmental Elective –I (Select any one)		3	1	0	40	60	100	4
MFOT1-156	Nutraceutical and Functional Foods							
MFOT1-157	Nutrition and Health							
Open Elective –I (Select any one)		3	0	0	40	60	100	3
Total		15	4	8	320	380	700	23

*Departmental Elective: Subject to the availability of teacher and minimum 10 students as per university guidelines.

**Open Elective: Student must choose open elective subject offered by other departments.

Semester 2 nd		Contact Hrs...			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFOT1-206	Basic Food Engineering	3	1	0	40	60	100	4
MFOT1-207	Technology of Cereals and Millets	3	1	0	40	60	100	4
MFOT1-208	Computer Fundamentals and Statistics	3	1	0	40	60	100	4
MFOT1-209	Technology of Cereals and Millets Lab.-III	0	0	4	60	40	100	2
Departmental Elective –II (Select any one)		3	1	0	40	60	100	4
MFOT1-258	Technology of Beverages							
MFOT1-259	Technology of Malting and Brewing							
Departmental Elective –III (Select any one)		3	1	0	40	60	100	4
MFOT1-260	Food Biotechnology							
MFOT1-261	Food Additives							
Total		15	5	4	260	340	600	22

*Departmental Elective: Subject to the availability of teacher and minimum 10 students as per university guidelines.

After 2nd semester the students will undertake an In-plant summer training of six weeks in industry/organization. The evaluation of training will be done in the fourth semester.

**MRSPTU M.Sc. (FOOD TECHNOLOGY) SYLLABUS 2018 BATCH ONWARDS
UPDATED ON 21.4.2018**

Semester 3 rd		Contact Hrs...			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFOT1-310	Technology of Fruits and Vegetables	3	1	0	40	60	100	4
MFOT1-311	Unit Operations in Food Engineering	3	1	0	40	60	100	4
MFOT1-312	Food Packaging	3	0	0	40	60	100	3
MFOT1-313	Technology of Fruits and Vegetables Lab.-IV	0	0	4	60	40	100	2
MFOT1-314	Food Packaging Lab.-V	0	0	4	60	40	100	2
Departmental Elective –IV (Select any one)*		3	0	0	40	60	100	3
MFOT1-362	Food Standards and Quality Assurance							
MFOT1-363	Technology Pulses and Oil seed							
Open Elective –II (Select any one)**		3	0	0	40	60	100	3
MFOT1-420	Thesis***	0	0	4	---	---	---	2
Total		15	2	12	320	380	700	23

*Departmental Elective: Subject to the availability of teacher and minimum 10 students as per university guidelines.

**Open Elective: Student must choose open elective subject offered by other departments.

***Thesis will continue in 4th semester. Students will have to finalize the topic of research and its objectives in 3rd semester.

Semester 4 th		Contact Hrs...			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MFOT1-415	Technology of Egg, Meat, Fish and Poultry	3	1	0	40	60	100	4
MFOT1-416	Technology of Milk and Milk Products	3	0	0	40	60	100	3
MFOT1-417	Food Analysis and Instrumentation	3	1	0	40	60	100	4
MFOT1-418	Technology of Animal Products Lab.-VI	0	0	4	60	40	100	2
MFOT1-419	In Plant Summer Training Viva	0	0	2	60	40	100	1
MFOT1-420	Thesis	0	0	16	Satisfactory/Unsatisfactory			8
Total		9	2	22	280	220	500	22

Overall

Semester	Marks	Credits
1 st	700	23
2 nd	600	22
3 rd	700	23
4 th	500	22
Total	2500	90

PRINCIPLES OF FOOD PRESERVATION

Subject Code: MFOT1-101

L T P C
3 1 0 4

Duration: 45 Hrs.

Unit-I (11 Hrs.)

Introduction and historical developments of food preservation.

Principles of Food Preservation. Food Spoilage: Microbial, physical, chemical and miscellaneous.

Heat Preservation and Processing: Thermal death curve, canning of foods, canning process, equipment, effect on food, aseptic processing.

Unit-II (12 Hrs.)

Dehydration: Drying curves, water activity, drying process, types of dryers, dehydration effect in food.

Concentration: Technology of concentration, equipment, process, and changes in food during concentration.

Intermediate Moisture (IM) Foods: Principles, characteristics, advantages, and problems in developing new IM foods.

Unit-III (12 Hrs.)

Refrigeration Storage: Requirements of refrigeration storage, changes in foods during refrigeration storage.

Freezing and Frozen Storage: Freezing curves, factors determining freezing rate, types of freezers, changes in food during freezing.

Ionizing Radiation: Source; equipment; mechanism of preservation, dose determination, effect on food.

Microwaves: Mechanism of heating, equipment and its effect on food.

Household Preservation Methods: Salt curing, oiling and smoking.

Chemical Preservation: types, uses and effects of class I and class II preservatives in foods.

Unit-IV (10 Hrs.)

Recent Methods in Food Preservation: Pulse electric, Ultrasound, Infrared, High pressure, Ohmic heating, Hurdle technology, Nanotechnology in food processing.

Recommended Books

1. N.P. Norman and H.H. Joseph, 'Food Science', CBS Publishers & Distributors Pvt. Ltd., New Delhi, India.
2. W.C. Frazier and D.C. Westhoff, 'Food Microbiology', Tata McGraw Hill Publishing Company Ltd., New Delhi, India.
3. M. Kalia and S. Sangita, 'Food Preservation and Processing', Kalyani Publishers, New Delhi, India.
4. B. Sivasankar, 'Food Processing and Preservation', Prentice Hall of India Pvt. Ltd., New Delhi, India.
5. J.N. Desrosier and N.W. Desrosier, 'Technology of Food Preservation', CBS Publishers & Distributors Pvt. Ltd., New Delhi, India.
6. P. Fellows, 'Food Process Technology: Principles and Technology', CRC Press, Cambridge, England.
7. N. Khetarpaul, 'Food Processing and Preservation', Daya Publishing House, New Delhi, India.

BASIC FOOD MICROBIOLOGY

Subject Code: MFOT1-102

L T P C
3 1 0 4

Duration: 45 Hrs.

Unit-I (10 Hrs.)

Microbiology: Introduction, historical developments in food microbiology; prokaryotes and eukaryotes; classification of microorganisms- a brief account; sources of microorganisms in foods; microbial growth, growth curve; factors affecting growth-intrinsic and extrinsic factors controlling growth of microorganisms, microbiological criteria of foods and their significance.

Unit-II (11 Hrs.)

Effect of food preservatives, heating process, irradiation, low temperature storage, chemical preservatives and high-pressure processing on the microbiology of foods; control of water activity and microbial growth, applications of hurdle technology for controlling microbial growth.

Unit-III (12 Hrs.)

Foods Microbiology and Public Health: food poisoning, types of food poisonings, important features etc; bacterial agents of food borne illness, food poisoning by clostridium, salmonella, E. coli, bacillus, staphylococcus etc.; non-bacterial agents of food borne illness: poisonous algae, and fungi - a brief account, the HACCP system and food safety used in controlling microbiological hazards.

Unit-IV (12 Hrs.)

Food spoilage and microbes of milk, meats, fish and various plant products, spoilage of canned foods; Indicators microorganisms, methods of isolation and detection of microorganisms or their products in food; conventional methods; rapid methods (newer techniques) – immunological methods; fluorescent, antibody, radio immunoassay, principles of ELISA, PCR (Polymerized chain reactions).

Recommended Books

1. J.M. Jay, 'Modern Food Microbiology', CBS Publishers, New Delhi, India.
2. G.J. Banwart, 'Basic Food Microbiology', CBS Publishers, New Delhi, India.
3. M.R. Adam and M.O. Moss, 'Food Microbiology', CRC Press, U.S.A.
4. B. Ray, 'Fundamental Food Microbiology', CRC Press, New York, U.S.A.
5. R.Y. Stanier, 'General Microbiology', Palgrave Macmillan, Dunfermline, United Kingdom.

FOOD CHEMISTRY

Subject Code: MFOT1-103

L T P C
3 1 0 4

Duration: 46 Hrs.

Unit-I (13 Hrs.)

Food Chemistry: Definition, scope and importance.

Carbohydrates: classification, physical and chemical properties of sugars, functional properties, and uses of pectic substances, gums and dietary fiber in food; browning reaction in food: enzymatic and non-enzymatic browning, their occurrence and applications in food; starches: functionality of starch in foods, gelatinization and retro-gradation of starches, modified starches, resistant starches.

Vitamins: Water and fat-soluble vitamins, use of vitamins in foods and their properties. Effect of processing on vitamins.

Minerals of Foods: Calcium, phosphorus, iron, copper, lead, zinc and arsenic.

Unit-II (11 Hrs.)

Proteins: structures of protein and amino acids; physical, chemical and functional properties of proteins, functional properties of food proteins, modification of food protein in processing and storage and its implications, texturized, denaturation of protein, gel formation. Enzymes-sources, properties, role of enzymes in dairy, starch and sugar, juice/beverage, and meat industry.

Unit-III 11 Hrs.)

Lipids: Classification, properties- lipolysis, auto-oxidation, rancidity and flavor reversion, thermal decomposition and effect of ionizing radiations; modification of fats and oils (hydrogenation and inter-esterification); role of food lipids in flavor; nutritional aspects of natural and modified fats; fat mimetics.

Unit-IV (11 Hrs.)

Plant Pigments: Chlorophyll, anthocyanins and carotenoids, occurrence, structure, chemistry, functions and changes during processing.

Essential Oils: Occurrence, structure, biosynthesis, monoterpene sesquiterpenes, oxygenated terpenes, extraction of essential oils, terpenes oils, uses in foods.

Flavoring compounds in foods.

Allergens, toxic constituents and anti-nutritional factors of foods (enzyme inhibitors, trypsin and chymotrypsin inhibitor, amylase inhibitor, flatulence causing sugars, phytolectins).

Recommended Books

1. L.H. Meyer, 'Food Chemistry', Van Nostrand, Reinhold Company Publication, New York, U.S.A.
2. C. Alias and G. Linden, 'Food Biochemistry', Ellis Horwood, New York, U.S.A.
3. Y. Pomeranz and R. Meloon, 'Food Analysis: Theory and Practice', Westport, An AVI Publication, New York, Sydney, Toronto.
4. R.O. Fennema, 'Food Chemistry', Marcel Dekker, New York, U.S.A.
5. L.H. Meyer, 'Food Chemistry', Van Nostrand, Reinhold Company Publication, New York, U.S.A.

FOOD ANALYSIS AND INSTRUMENTATION LAB.- I

Subject Code: MFOT1-104

L T P C

0 0 4 2

1. Analysis of given food sample for its moisture, fat, protein and ash contents.
2. Determination of vitamin C content in a given sample of citrus juice.
3. Estimation of Calcium and Phosphorus content in a given sample of food.
4. Calculation of Iodine value and Saponification value of given sample of fat or oil.
5. Estimation of Tannins in a given sample of Tea.
6. To study the process of Thin Layer Chromatography (TLC) to separate out various components in a given sample.
7. To estimate the amount of reducing sugars in a given food sample.
8. Calculation of smoke point, flash point and fire point of a given sample of vegetable oil.
9. Estimation of Caffeine content in a given sample of coffee.

10. Determination of Crude Fiber content in given sample of vegetable/fruit.
11. Determination of non-reducing sugars, total sugars and starch in fruit sample.
12. Determination of total ash, acid insoluble and soluble ash in a given flour sample.
13. Estimation of rancidity in rancid oil/fat.
14. Detection of adulterants in oil/fat samples.
15. Estimation of Free Fatty Acids (FFA) in crude and refined oil sample.
16. Sensory analysis of various processed food products like jam, bread, and biscuit.
17. Determination of % age moisture, fat and curd content of Table Butter.

FOOD MICROBIOLOGY LAB.-II

Subject Code: MFOT1-105

L T P C

0 0 4 2

1. Study of the different parts and use of laboratory microscope.
2. Preparation and sterilization of culture media, glassware.
3. Estimation of bacterial population in a given sample of food by Direct Microscopic Count (DMC) method.
4. Estimation of bacterial load of food sample by SPC (Standard Plate Count) method.
5. Inoculation of pure culture of bacteria by Pour Plate and Streak Plate methods.
6. To study simple staining of bacteria.
7. To conduct Gram's staining of bacteria and differentiate between Gram +ve and Gram -ve bacteria.
8. Determination of bacteriological quality of potable water and soft drinks by SPC method.
9. Microbial analysis of Cereals and Cereal products such as wheat flour and biscuits.
10. Microbial analysis of spices (red chilies and coriander).
11. Detection of presence of E. coli and other Coliform bacteria by rapid high coliform test.
12. Detection of presence of coliforms in water by MPN method.
13. Studies on the bacterial growth curve.
14. Estimation of Total Microbial Count of:
 - i) Surrounding air
 - ii) Workers
 - iii) Fruit and vegetable products
15. Isolation of bacteria by serial dilution technique.
16. To study various sub-culturing techniques

NUTRACEUTICALS AND FUNCTIONAL FOODS

Subject Code: MFOT1-156

L T P C

3 1 0 4

Duration: 45 Hrs.

Unit-I (10 Hrs.)

Defining nutraceuticals and functional foods. Nature, type and scope of nutraceutical and functional foods.

Nutraceutical and functional food applications and their health benefits. Nutraceutical compounds and their classification based on chemical and biochemical nature with suitable and relevant descriptions.

Unit-II (12 Hrs.)

Nutraceuticals for specific situations such as cancer, heart disease, stress, osteoarthritis, hypertension.

Antioxidants and other phytochemicals, (isoflavones, lycopenes), their role as nutraceuticals and functional foods.

Dietary fibers and complex carbohydrates as functional food ingredients.

Unit-III (12 Hrs.)

Protein as a functional food ingredient.

Probiotic foods and their functional role.

Cereal products as functional foods – oats, wheat bran, rice bran etc.

Unit-IV (11 Hrs.)

Functional vegetable products, oil seeds and sea foods.

Coffee, tea and other beverages as functional foods/drinks and their protective effects.

Effects of processing, storage and interactions of various factors on the potentials of such foods.

Recommended Books

1. G. Mazza, 'Functional foods: Biochemical and Processing Aspects', Techonomic Publication Lancaster, USA.
2. R.S. Kirk and R. Sawyer, 'Pearson's Composition and Analysis of Foods', Wesley Longman Inc. California, USA.
3. R.E.C. Wildman, 'Handbook of Nutraceuticals and Functional Foods', CRC Press, New York, U.S.A.
4. AOAC, 'Official Methods of Analysis', Association of Official Analytical Chemists, USA.

NUTRITION AND HEALTH

Subject Code: MFOT1-157

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Unit-I (10 Hrs.)

Foods and Nutrients: Basic definitions, functions of food and nutrients, levels of nutritional status, changing concepts of nutrition.

Energy: Energy content of foods, physiological fuel value - review, measurement of energy expenditure. estimating energy requirements of individuals and groups. regulation of energy metabolism, control of food intake and weight.

Energy Balance: Food energy measure, energy control in human metabolism, basal metabolic rate (B.M.R.), factors affecting B.M.R., measuring B.M.R., energy requirements and its estimation.

Unit-II (12 Hrs.)

Nutrition and Weight Management: Obesity and its causes, body composition, B.M.I., weight for height measures, health implications of obesity, problems of weight management.

Glycaemia Index of Foods: Control its importance.

Recommended dietary allowances (R.D.A.), ICMR standards, food guide, exchange lists, health promotion guidelines

Carbohydrates: Classification, dietary importance, Special functions of carbohydrates in body tissues, Relationship between dietary fiber and various health problems

Unit-III (12 Hrs.)

Fats: Functions of EFA, role of ω -3, ω -6 fatty acids in health and disease. Trans fatty acids and prostaglandins, essential fatty acids, cholesterol, LDL and HDL and their health importance

Proteins: Nature and essentiality of amino acids and proteins, Functions of protein, the concept of protein balance, Comparative quality of food proteins, Biological value, Net protein utilization, Protein efficiency ratio, Therapeutic applications of specific amino acids

Vitamins: Clinical applications, sources, requirements and functions of vitamin A, D, E, K, C and 'B' complex, vitamins toxicity problems.

Unit-IV (11 Hrs.)

Minerals: Minerals in human health, macro and micro minerals, trace minerals- functions, clinical applications, food sources and requirements

Functional Foods: concept and categories of functional foods and their importance

Food security: problem and prospects

Recommended Books

1. P. Insel, R.E. Turner and D. Ross, 'Discovering Nutrition', ADA, Jones and Bartlett Publishers Inc., USA.
2. S.R. Williams, 'Essentials of Nutrition and Diet Therapy', Mosby Publishing, New York, U.S.A.
3. P.V. Hegarty, V. Hegarty, 'Nutrition Food and the Environment', Eagen Press, United States.
4. A.F. Brian and G. Allen, 'Food Science, Nutrition & Health', Edward Arnold, A member of Hodder Headline Group London, Sydney, Auckland.
5. S.R. Mudambi and M.V. Rajagopal, 'Fundamentals of Food & Nutrition'. New Age International (P) Limited, Publishers, New Delhi, India.
6. ICMR, 'Nutrient Requirement & RDA' ICMR, New Delhi.
7. M.J. Gibney, M. Elia, O. Ljungqvist and J. Dowsett, 'Clinical Nutrition', The Nutrition Society Textbook Series, Blackwell Publishing Company.

BASIC FOOD ENGINEERING

Subject Code: MFOT1-206

L T P C
3 1 0 4

Duration: 45 Hrs.

Unit-I (11 Hrs.)

Fundamental Concepts and Definitions: Dimensions and units, thermodynamic systems (closed, open and isolated), intensive and extensive properties, equilibrium state, density, specific volume, specific weight, specific heat, enthalpy, entropy, pressure, temperature scales.

Material Balances: Basic principles, process flow diagrams, total mass balance, component mass balance, material balance problems involved in dilution, concentration and dehydration.

Unit-II (12 Hrs.)

Energy Balances: Basic principles, energy terms, specific heat of solids and liquids, properties of saturated and superheated steam, heat balances.

Fluid Flow Principles: Fluid statics and dynamics, mass balance and energy balance, Bernoulli's equation, concept of viscosity, Newtonian and non-Newtonian fluids, streamline and turbulent flow, Reynold's number.

Unit-III (12 Hrs.)

Heat Transfer: Modes of heat transfer, conductive, convective and radiative heat transfer, thermal properties of foods, conductive heat transfer in a rectangular slab, tubular pipe and multilayered systems, estimation of convective heat transfer coefficient, forced convection and free convection, estimation of overall heat transfer coefficient.

Heat Exchangers: plate, tubular, scraped surface and steam infusion.

Unit-IV (10 Hrs.)

Thermal Process Calculations: Commercially sterile concept, concept of D, F and Z values, reference F value, effect of temperature on thermal inactivation of micro-organisms, lethality function, thermal process calculation for canned foods. Calculation of processing time in continuous flow systems. Thermal process calculation for canned foods.

Psychrometrics: Properties of dry air: composition of air, specific heat of dry air, enthalpy of dry air and dry bulb temperature.

Properties of Water Vapor: specific volume of water vapor, specific heat of water vapour, Gibbs-Dalton law, Dew point temperature, relative humidity, humidity ratio, wet bulb temperature.

Study of Psychrometric chart.

Recommended Books

1. R.P. Singh and D.R. Heldman, 'Introduction to Food Engineering', Academic Press, INC, London.
2. R.L. Earle, 'Unit Operations in Food processing', Pergamon Press Oxford, U.K.
3. R.T. Toledo, 'Fundamentals of Food Process Engineering', CBS Publishers, New Delhi, India.
4. J.C. Batty and S.L. Folkman, 'Food Engineering Fundamentals', John Wiley and Sons, New York, U.S.A.

TECHNOLOGY OF CEREALS & MILLETS

Subject Code: MFOT1-207

L T P C
3 1 0 4

Duration: 45 Hrs.

Unit-I (12 Hrs.)

Wheat Chemistry and Technology: Structure and chemical composition of wheat grain. Criteria of wheat quality – physical and chemical factors. Wheat milling – general principles and operation; cleaning, conditioning and roller milling systems. Flour extraction rates and various flour grades. criteria of flour quality. enzymes of wheat and their technological significance. Dough rheology and its measurement. Functionality of wheat proteins, carbohydrates, lipids and enzymes in bread making. Durum wheat- chemistry, quality and technology of pasta products.

Unit-II (10 Hrs.)

Bread making processes, importance of critical unit operations, functions of ingredients/additives such as fat, emulsifiers, oxidants, reducing agents and conditioners. Bread faults and remedies. Technology of biscuit, cake, cookie and cracker manufacturing. Baking powders as leavening agents in bakery industry.

Unit-III (12 Hrs.)

Rice Chemistry and Technology: Structure and chemical composition of rice grain, milling of rice–types of rice mill; huller mill, Sheller-cum-cone polisher mill. modern rice milling unit

operation-dehusking, paddy separation, polishing and grading. Factors affecting rice yield during milling. By-products of rice milling. rice parboiling technology. CFTRI process of parboiling. Properties of parboiled rice, changes during parboiling. Advantages and disadvantages of parboiling. cooking characteristics of rice. rice convenience foods: precooked rice, canned rice, expanded rice, rice-based infant food formulae, rice cakes, rice noodles.

UNIT-IV (11 Hrs.)

Corn Technology: Wet and dry milling of corn, products of wet and dry milling of corn, corn sweeteners and their uses.

Malt Technology: Malting of barley: steeping, germination and drying. different types of malts and their food applications.

Technology of Coarse Cereal Grains: chemical, technological and milling aspects of sorghum, oats and millets.

Recommended Books

1. A.M. Samuel, 'The Chemistry and Technology of Cereals as Food and Feed', CBS Publisher & Distribution, New Delhi, India.
2. Y. Pomeranz, 'Wheat: Chemistry and Technology', American Association of Cereal Chemists, St. Paul, MN, U.S.A.
3. A.C. Eliasson and K. Larsson, 'Cereals in Bread Making', Marcel Dekker. Inc. New York, U.S.A.
4. R.C. Honeney, 'Principles of Cereal Science and Technology', American Association of Cereal Chemists, St. Paul, U.S.A.
5. Y. Pomeranz, 'Advances in Cereal Science and Technology', American Association of Cereal Chemists, St. Paul, U.S.A.
6. B.O. Juliano, 'Rice Chemistry and Technology', American Association of Cereal Chemists, St. Paul, U.S.A.
7. J.M.V. Blanshard, P.J. Frazier and T. Galliard, 'Chemistry and Physics of Baking', Royal Society of Chemistry, London.
8. A. Chakraverty, 'Postharvest Technology of Cereals, Pulses and Oilseeds', Oxford and IBH, New Delhi, India.
9. S.C. Durbey, 'Basic Baking: Science and Craft', Gujarat Agricultural University, Anand (Gujrat).
10. N.L. Kent, 'Technology of Cereals', Pergamon Press, Oxford, UK.
11. R.H. Matthews, 'Legumes: Chemistry, Technology and Human Nutrition', CRC Press, New York, U.S.A.
12. D.K. Salunkhe, S.S. Kadam, 'Handbook of World Food Legumes: Chemistry, Processing and Utilization', CRC Press, Florida, U.S.A.

COMPUTER FUNDAMENTALS AND STATISTICS

Subject Code: MFOT1-208

**L T P C
3 1 0 4**

Duration: 46 Hrs.

Unit-I (11 Hrs.)

Introduction of Computer: Characteristics, classification of computer; block diagram of computer and overview of working.

Number System: Non-positional vs. positional number, binary, octal, decimal, hexa-decimal conversion of number system.

Unit-II (10 Hrs.)

Hardware: Input, output, and secondary storage devices, central processing unit.

Software: Types of software; meaning, functions and types of operating system.

Unit-III (13 Hrs.)

Understanding Computer Networks: Types; topologies for LANS, transmission media; analog and digital signals; network security.

Working with Software Packages: An introduction to PC-software packages; word processor-working with text, tables, checking spelling and grammar, printing a document; spreadsheet software-working with worksheet, formulas and functions, inserting charts; PowerPoint presentation-working with different views and designing presentation; window XP-working with files and folders, windows explorer.

Lab.: Windows explorer, MS-Word, MS-Excel, MS-PowerPoint and Internet Surfing.

Unit-IV (12 Hrs.)

Methods of data collection, sampling and sampling methods, measurement of central tendency, mean, median, mode, standard deviation, standard error, variance. Correlation & regression analysis, analysis of variance (ANOVA), tests of significance, t-test, z- test and f- test.

Recommended Books

1. 'Introduction to Information Technology', Pearson Education, New Delhi, India.
2. P. Norton, 'Introduction to Computers', Tata McGraw Hill Education Pvt. Ltd., New Delhi, India.
3. D.E. Comer, 'Computer Networks and Internet', Pearson Education, New Delhi, India.
4. V. Rajaraman, 'Fundamentals of Computers', Prentice Hall of India, New Delhi, India.
5. 'Office 2000: No Experience Required', BPB Publications, New Delhi, India.
6. A.K. Ray and T. Acharya, 'Information Technology: Principles and Applications', Prentice Hall of India, New Delhi, India.
7. A.S. Tanenbaum, 'Computer Networks', Eastern Economy Edn., PHI, New Delhi, India.

TECHNOLOGY OF CEREALS LAB.-III

Subject Code: MFOT1-209

**L T P C
0 0 4 2**

Duration: 48 Hrs.

1. Experimental milling of rice and assessment of presence of head, broken and immature kernels and degree of polish.
2. Experimental parboiling of rice by different methods and evaluation of parboiled rice.
3. Determination of proximate analysis of wheat flour for moisture, ash, protein and fat contents.
4. Determination of wet gluten and dry gluten content of given sample of wheat Flour.
5. Determination of alpha-amylase activity in wheat flour by falling number apparatus.
6. Determination of amylose content of cereal and legume starches by iodine binding method.
7. Isolation of rice starch and its quantification.
8. Determination of different cooking parameters of various rice cultivars.
9. Determination of the alcoholic acidity of a given sample of wheat flour.

10. Study of pasting properties of corn starch by Rapid Visco Analyzer.
11. Study of thermal properties of different Cereal starches by Differential Scanning Calorimeter.
12. To compare different types of wheat flours by Polenshke test.
13. Determination of turbidity and percentage light transmittance of cereal starches
14. Determination of textural properties of cooked rice using Texture Analyzer.
15. Experimental baking of different baked products like biscuits, breads and cakes and their evaluation for different parameters.
16. Visit to milling and bakery industry.

TECHNOLOGY OF BEVERAGES

Subject Code: MFOT1-258

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Unit-I (10 Hrs.)

Beverages: Definition, types, importance of beverages in our diets.

Treatment of water for food industry.

Technology of Alcoholic Beverages: Wine, cider, brandy, perry, toddy, bear and whisky.

Unit-II (12 Hrs.)

Manufacturing of carbonated beverages and technology of carbonation.

Technology of soft drinks, ingredients and additives used in production of soft drinks.

Citrus beverages, whey beverages and utilization of whey in development of fortified drinks, use of low calorie sweeteners in beverages.

Unit-III (11 Hrs.)

Production, processing and chemistry of tea manufacturing and types of tea.

Production, processing, roasting and brewing of coffee, soluble coffee, decaffeinated coffee, monsoon coffee, coffee brew concentrate and chicory.

Unit-IV (12 Hrs.)

Cocoa processing, cocoa beverages and chocolate.

Packaged drinking water- manufacturing processes, quality evaluation of raw and processed water, methods of water treatment, BIS quality standards of bottled water.

Recommended Books

- 1 D.K. Tressler and M.A. Joslyn, 'Fruit and Vegetable Juice Processing Technology', The AVI Publication Com., Inc. U.S.A.
- 2 N. Manay Shakuntala and M. Shadaksharaswamy, 'Foods: Facts and Principles', New Age Inter. Publishers, New Delhi, India.
- 3 N.F. Haard and D.K. Salunkhe, 'Postharvest Biology and Handling of Fruits and Vegetables', AVI Publishing Co. Westport, U.S.A.
- 4 A.A. Kader, 'Postharvest Technology of Horticultural Crops', University of California, Division of Agriculture and National Resources, California, U.S.A.

TECHNOLOGY OF MALTING AND BREWING

Subject Code: MFOT1-259

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Unit-I (12 Hrs.)

Barley production and trade, composition and structure of barley. preparation and storage of barley for malting, suitability of different cereals for malting, characteristics of barley for malting and brewing, problem of dormancy and water sensibility. Steeping techniques, Germination of barley, morphological, enzymatic and chemical changes during malting, Role of gibberellic acid in malting, Techniques of malting composition of malt, malting of wheat and other cereals. Kilning, changes during kilning, Kilning techniques.

Unit-II (12 Hrs.)

Quality evaluation of malt, special malts, milling techniques. significance of water quality in brewing process mashing: changes during mashing, methods of mashing, treatment of cereals used as adjuncts, properties and complications of using adjuncts of different sources. Filtration of wort and sparging. spent grain: composition and uses.

Unit-III (11 Hrs.)

Techniques of wort boiling, changes during boiling, hops, selection of hops, acidification of mash, wort cooling, methods of fermentation, management of primary fermentation.

Lagering: Objectives and techniques.

Beer: Composition, filtration, racking, pasteurization and defects.

Unit-IV (10 Hrs.)

Application of Malt in Food: Baking, infant food etc. Quality control–malt specifications and test procedures. Brewing operations, constituents of hops. brewing adjuncts
Beer quality–flavor, taste, alcohol content, chemical constituent etc. Head retention–factors affecting head retention. Haze formation.

Recommended Books

1. M.J. Lewis and T.W. Young 'Malting and Brewing Science Vol. I', Springer Science & Business Media, Germany.
2. M.J. Lewis and T.W. Young 'Malting and Brewing Science Vol. II', Springer Science & Business Media, Germany.

FOOD BIOTECHNOLOGY

Subject Code: MFOT1-260

**L T P C
3 1 0 4**

Duration: 45 Hrs.

Unit-I (10 Hrs.)

Introduction to Food Biotechnology: basic principles of genetic engineering, improvement of the processing of various crops by genetic engineering, food safety.

Unit-II (11 Hrs.)

Natural Antimicrobials for Food Preservation: Phytoalexins, essential oils and their components, bacteriocins of Lactic acid bacteria, nisin, pediocins etc, applications of bacteriocins in food systems. Aflatoxins - production, control and reduction using molecular strategy.

Unit-III (12 Hrs.)

Protein Engineering in Food Technology: Methods, applications of protein engineering (e.g. glucose isomerase, Lactobacillus beta-galactosidase and peptide antibiotic nisin).

Biotechnology and Food Ingredients: Biogums, fat substitutes, biocolours, organic acids and sweeteners.

Unit-IV (12 Hrs.)

Food Biotechnology and Intellectual property rights (IPR), benefits of securing IPRs; bioethics in food biotechnology.

Transgenic Plants and Animals: Their contribution to food production enhancement.

Recommended Books

1. B.H. Lee, 'Fundamentals of Food Biotechnology', VCH Publishers, New York, U.S.A.
2. M.P. Tombs, 'Biotechnology in Food Industry', Wiley-Blackwell, U. K.
3. D. Knorr, 'Food Biotechnology', Marcel Dekker, INC, New York, U.S.A.
4. A. Schwartzberg and A Rao 'Biotechnology & Food Process Engineering' Marcel Dekker, INC, New York.
5. I. Goldberg and R. Williams, 'Biotechnology and Food Ingredients', Springer Science & Business Media, Germany.
6. R.D. King and P.S.J. Cheetham, 'Food Biotechnology', Elsevier Applied Science, London.

FOOD ADDITIVES

Subject Code: MFOT1-261

L T P C
3 1 0 4

Duration: 45 Hrs.

Unit-I (11 Hrs.)

Introduction to Food Additives: General classification, types, uses, functions, legal aspects, risks and benefits.

Preservatives: Antimicrobial agents (types, mode of action and their application), antioxidants (types and mechanism of oxidation inhibition), anti-browning agents (types, functions and mode of action).

Chelating Agents and Sequestrants: Types, uses and mode of action.

Unit-II (12 Hrs.)

Acidulants and pH Control Agents: Types, uses and mode of action.

Coloring Agents: Synthetic food colorants, color chemistry, applications and levels of use, natural colorants, sources of natural color (plant, microbial, animal and insects), misbranded colors, color extraction techniques, color stabilization

Flavoring Agents: flavors (natural and synthetic flavors), off flavor in foods, flavor enhancers, flavor stabilization, flavor encapsulation.

Unit-III (11 Hrs.)

Sweeteners: Natural and artificial sweeteners, nutritive and non-nutritive sweeteners, properties and uses of saccharin, acesulfame-K, aspartame, corn sweeteners, invert sugar sucrose and sugar alcohols (polyols) as sweeteners in food products

Emulsifiers: Types, selection of emulsifiers, emulsion stability, functions and mechanism of action.

Stabilizers: Types, uses and functions.

Unit-IV (11 Hrs.)

Food Spices and Condiments: Types and uses spices and condiments, chemical composition, extraction, general processing, uses and special attributes of important Indian spices like pepper, cinnamon, clove, ginger, turmeric, cardamom, fenugreek and fennel etc., seasonings and condiments blends.

Advances in Food Additives: Classification, functions, safety aspects, recent advances with relevance to color, flavor enhancement, sweeteners and preservatives.

Recommended Books

1. A.L. Branen, 'Food Additives', Marcel Dekker Inc., New York, U.S.A.
2. J.W. Purseglove 'Spices' Longman Publishers, London, England.
3. D.R. Tainter and A.T. Grenis, 'Spices and Seasonings- A Food Technology Handbook', VCH Publishers, Inc., Hoboken, U.S.A.
4. J. Merory, 'Food Flavorings, Composition, Manufacture and Use', AVI Publishing Inc., Westport, U.S.A.
5. K.T. Farrell 'Spices, Condiments and Seasonings', Springer, U.S.A.

TECHNOLOGY OF FRUITS AND VEGETABLES

Subject Code: MFOT1-310

L T P C

Duration: 45 Hrs.

3 1 0 4

Unit-I (11 Hrs.)

Classification and nutritional value of fruits and vegetables. Pre-harvest factors influencing post-harvest physiology, post-harvest handling, physical and chemical techniques to increase the post-harvest life of fresh fruits and vegetables.

Physical and chemical indices of fruit maturity, ripening, bio-chemical changes during ripening, processing and storage.

Unit-II (11 Hrs.)

Different storage methods for fruits and vegetables like modified atmospheric storage, cold storage, controlled atmospheric storage etc.

Preprocessing operations; Washing, blanching, peeling, sorting/grading, peeling, blanching, coring, destoning. Minimal processing of fruits and vegetables, quality factors for processing, fruit product order (FPO).

Unit-III (12 Hrs.)

Technology of jam, jellies, marmalades, specifications, role of pectin and theories of gel formation.

Technology for juice pressing, juice extraction and clarification, methods of bottling, enzymatic clarification and debittering of juices, fruit juice powders- preparation and packaging.

Fruit juice beverages, squash, cordial, crush, RTS, nectar, syrups, their types and production, blending of juices.

Technology of tomato products: Sauce, puree, ketchup and tomato paste

Fruit preserves and candied fruits, dehydrated fruits & vegetables, spoilage of processed products.

Unit-IV (11 Hrs.)

Canning of fruits and vegetables, preparation of syrups and brines, method and spoilage of canned fruits and vegetables.

By products from fruit and vegetable wastes.

Mushroom Technology: Types of edible mushrooms, processing of mushrooms.

Recommended Books

1. R.P. Srivastava and S. Kumar, 'Fruit and Vegetable Preservation – Principles and Practices', Bio-Green Books, New Delhi, India.
2. A.K. Thompson, 'Fruit and Vegetables – Harvesting, Handling and Storage' Blackwell Publishing, UK.
3. B. Pantastico, 'Post Harvest Physiology, Handling and Utilization of Tropical and Subtropical Fruits and Vegetables', AVI Publishing Company, Inc., Westport, U.S.A.
4. W.V. Cruess, 'Commercial Fruit and Vegetable Products', Allied Scientific Publishers, Bikaner, India.
5. Girdharilal, 'Preservation of Fruits and Vegetables', ICAR, New Delhi.
6. M.E. Dauthy, 'Fruit and Vegetable Processing', International Book Distributing Co. Lucknow, India.
7. L.P. Hamson, 'Commercial Processing of Vegetables', Noyes Data Corporation, New Jersey.

UNIT OPERATIONS IN FOOD ENGINEERING

Subject Code: MFOT1-311

L T P C

Duration: 45 Hrs.

3 1 0 4

Unit-I (10 Hrs.)

Preliminary Unit Operations: Material handling: Conveyors and elevators, types of conveyors and elevators.

Cleaning: Dry-cleaning; screening, aspiration and magnetic cleaning, wet cleaning; soaking, spray washing, ultrasonic washing, sorting and grading: methods, advantages of sorting and grading.

Unit-II (12 Hrs.)

Conversion Unit Operations: Size reduction: Benefits, criteria for size reduction, size reduction of solid, fibrous and liquid foods.

Mixing: Mixing terminology, mixers for dry solids (tumbler and vertical screw mixers). mixers for high viscosity pastes (dough mixer), mixers for low viscosity pastes, effect of mixing on foods.

Filtration: Filtration terminology (feed slurry, filtrate, filter medium, filter cake), filtration equipment.

Unit-III (11 Hrs.)

Processing/Preservation Unit Operations: High temperature operations: Pasteurization, pasteurizer and its functioning.

Evaporation: Single effect evaporator, multiple effect evaporators and plate evaporators, batch type pan evaporators, natural circulation, forced circulation, rising film, falling film and agitated thin film evaporators.

Dehydration: Terminology, dehydration systems; tray drier, tunnel drier, spray drier, fluidized bed drying, vacuum drying and drum driers.

Unit-IV (11 Hrs.)

Low Temperature Operations: Refrigeration, components of refrigeration system, compressors, condensers and expansion valve, selection of refrigerant, cooling load, coefficient of performance, refrigerant flow rate.

Freezing Systems: Direct contact and indirect systems, freezing load calculations.

Freeze Drying: Conventional drying versus freeze drying, Basic principle, freeze dryer and its components

Recommended Books

1. R.P. Singh and D.R. Heldman, 'Introduction to Food Engineering', Academic Press, INC, London.
2. R.L. Earle, 'Unit Operations in Food processing', Pergamon Press, Oxford, U.K.
3. J.G. Brennan, J. R. Butters, N. D. Cowell and A. E. V. Lilley, 'Food Engineering Operations', Elsevier, New York, U. S. A.
4. J.C. Harper, 'Elements of Food Engineering', AVI, Westport, U.S.A.

FOOD PACKAGING

Subject Code: MFOT1-312

L T P C
3 0 0 3

Duration: 36 Hrs.

Unit-I (9 Hrs.)

Introduction to food packaging, primary food packaging and secondary packaging, factors involved in the evolution and selection of a food package, functions of food packaging
Packaging requirements of selected foods-cereals and snack food, beverages, milk and dairy products, poultry & eggs, red meat, frozen food, horticultural products.

Safety considerations in food packaging: Food safety problems associated with package, package labeling and food safety, recycling of packaging materials.

Unit-II (9 Hrs.)

Paper and Paper Based Packaging Materials: Types of paper (Kraft, bleached, greaseproof) paper products (paper bags, cartoons, drums and molded paper containers), functional properties of paper, testing of paper packaging materials.

Plastic Packaging Materials: Classification of polymers, functional and mechanical.

Properties of thermoplastic polymers, processing and converting of thermoplastic polymers (extrusion, blow molding, injection molding, compression molding, lamination and heat sealing).

Unit-III (9 Hrs.)

Metal Packaging Materials: Functional properties of metal containers, tin plate containers - quality control tests, can manufacturing and protective coatings.

Glass Packaging Materials: Composition and manufacturing of glass containers, glass container nomenclature, mechanical and optical properties of glass containers, testing of glass containers.

Aseptic Packaging of Foods: Sterilization of packaging material, food contact surfaces & aseptic packaging systems, retort pouches.

Unit-IV (9 Hrs.)

Active Food Packaging: Definition, physical and chemical principles involved.

Edible Films and Coatings as Active Layer: Concept, different edible films used, use of edible active layers to control water vapor transfer and gas exchange

Oxygen Absorbents: Classification and main type of oxygen absorbents, factors influencing the choice of oxygen absorbents, application of oxygen absorbents for shelf -life extension of foods, disadvantages of oxygen absorbents.

Ethanol Vapor: Ethanol vapor generator, uses of ethanol for shelf - life extension of foods, disadvantages of ethanol/vapor generators.

Recommended Books

1. G.L. Robertson, 'Food Packaging: Principles and Practice', Taylor & Francis.
2. S. Sacharow and R.C. Griffin, 'Principles of Foods Packaging', Avi Publication Co. Westport, U.S.A.
3. A.S. Athalye, 'Plastics in Packaging', Tata McGraw Hill Publishing Co., New Delhi, India.
4. M.L. Rooney, 'Active Food Packaging', Blackie Academic & Professional, Glasgow, UK.
5. M. Bakker, 'The Wiley Encyclopedia of Packaging Technology', John Willey & Sons. Inc; New York, U.S.A.
6. 'Food Packaging Technology Handbook', NIIR Board, National Institute of Industrial Research, New Delhi, India.
7. R. Ahvenainen, 'Novel Food Packaging Techniques', CRC Press, U.S.A.
8. J. Han and J. Han, 'Innovations in Food Packaging', Elsevier Academic Press, U.S.A.
9. R. Coles, D. McDowell and M.J. Kirwan, 'Food Packaging Technology', CRC Press, U.S.A.

TECHNOLOGY OF FRUITS & VEGETABLES LAB.-IV

Subject Code: MFOT1-313

L T P C
0 0 4 2

1. Extraction of Juices of different fruit (citrus, pomegranate, apple) and
 - i) Evaluation of Vitamin C content
 - ii) Determination of pH
 - iii) Evaluation of Browning Time
 - iv) Determination of Acidity
 - v) Cost evaluation of Juice
 - vi) Sensory evaluation of the products
 - vii) Shelf -life study
2. Preparation of Jams (using different fruits) and
 - i) Determination of Pectin content
 - ii) Evaluation of Total Soluble Solids
 - iii) Evaluation of Sugars using lane eynon method
 - iv) Determination of pH
 - v) Evaluation of Acidity
 - vi) Sensory evaluation of the products
 - vii) Cost evaluation product prepared sensory evaluation & organoleptic test
3. Preparation of Jelly and
 - i) Estimation of Pectin content
 - ii) Determination of total soluble solids (TSS)
 - iii) Jelmeter test
 - iv) Checking for pH
 - v) Checking of Acidity

- vi) Cost evaluation of product
- vii) Microbiological analysis
- viii) Sensory evaluation of the products
4. Preparation of Marmalade (using different fruits)
 - i) Jam Marmalade
 - ii) Jelly Marmalade
5. Preparation of Preserves and Candies
 - i) Evaluation of TSS
 - ii) Determination of End point
 - iii) Microbiological Analysis
 - iv) Evaluation of product cost
 - v) Sensory evaluation of the products
6. Preparation of Potato chips and
 - i) Calculation of product dimension
 - ii) Determination of time-temp combination for product
 - iii) Study of the effect of anti-browning agents
7. Preparation of Tomato products (Sauce, Ketchup, Soup, puree) for
 - i) Evaluation of TSS
 - ii) Evaluation of pH
 - iii) Evaluation of acidity
 - iv) Cost evaluation
 - v) Microbiological analysis
8. Pickling & Fermented products
9. Preparation and shelf-life study of ready-to-serve beverages
10. Experimental studies on drying and dehydration of fruits and vegetables

FOOD PACKAGING LAB.-V

Subject Code: MFOT1-314

**L T P C
0 0 4 2**

1. Designing of an ideal packaging material for different type of food products.
2. Identification of different packaging materials.
3. Testing of paper based packaging materials.
4. Equilibrium Relative Humidity (ERH) study of foods.
5. To study uniformity and amount of wax in wax paper for packaging of hygroscopic foods.
6. To study chemical resistance of plastic and paper packaging materials.
7. To study Water Vapor Transmission Rates (WVTR) of paper and plastic polymers.
8. Shelf life studies of packaged foods.
9. Study of grease resistance of paper, plastic laminates and aluminum foil for the packaging of fatty foods.
10. To perform various functional tests on corrugated fiberboard boxes.
11. Determination of Cobb value of different types of paper board.
12. Shrink Packaging of poultry products.
13. Aseptic packaging of different food products.
14. Vacuum Packaging of dry powders.

15. Testing of glass containers for thermal shock resistance.
16. Determination of tensile strength and heat seal strength of different plastics.
17. To conduct drop and vibration tests on different types of corrugated fiberboard boxes.
18. Determination of tin coating weight and porosity of tin plate container.
19. Determination of lacquer coating in tin containers.
20. Study of manufacture of 2-piece and 3-piece metal cans.
21. Visit to paper manufacturing industry.

FOOD STANDARDS AND QUALITY ASSURANCE

Subject Code: MFOT1-362

**L T P C
3 0 0 3**

Duration: 38 Hrs.

Unit-I (8 Hrs.)

Introduction to concepts of food quality, food safety, food quality assurance and food quality management; objectives, importance and functions of quality control, Current challenges to food safety Food adulteration, nature of adulterants, methods of evaluation of food adulterants and toxic constituents.

Unit-II (10 Hrs.)

Principles of food quality assurance, total quality management (TQM), good manufacturing /management practices, good hygienic practices, good lab practices, general awareness and role of management practices in quality control Food safety management, applications of HACCP in food safety, concept of food traceability for food safety.

Unit-III (9 Hrs.)

Microbial Quality Control: Determination of microorganisms in foods by cultural, microscopic, physical, chemical methods. Statistical quality control in food industry Food safety and Standards Act 2006: salient provision and prospects.

Unit-IV (11 Hrs.)

Role of national and international regulatory agencies, Bureau of Indian Standards (BIS), AGMARK, Food Safety and Standards Authority of India (FSSAI), Codex alimentarius commission, USFDA, International organization for standards (ISO) and its standards for food quality and safety (ISO 9000 series, ISO 22000, ISO 15161, ISO 14000).

Recommended Books

1. R. Early, 'Guide to Quality Management Systems for the Food Industry', Blackie, Academic and Professional, London.
2. W.A. Gould and R.W. Gould, 'Total Quality Assurance for the Food Industries', CTI Publications Inc. Baltimore.
3. Y. Pomeraz and C.E. MeLoari, 'Food Analysis: Theory and Practice', CBS Publishers and Distributor, New Delhi, India.
4. F.L. Bryan, 'Hazard Analysis Critical Control Point Evaluations- A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage', World Health Organization, Geneva.
5. R. Kirk and R. Sawyer, 'Pearson's Composition and Analysis of Food', Longman Scientific and Technical, England.
6. 'Manuals of Food Quality Control, Additives Contaminants Techniques', Food and Agricultural Organization, Rome.

7. T.E. Furia, 'Regulatory Status of Direct Food Additives', CRC Press, Florida, U.S.A.

TECHNOLOGY OF PULSES AND OIL SEEDS

Subject Code: MFOT1-363

L T P C
3 0 0 3

Duration: 38 Hrs.

Unit-I (8 Hrs.)

Importance of fats and oils in human nutrition, Chemical, physical and functional properties of fats and oils.

Importance of oilseeds processing in India.

Unit-II (10 Hrs.)

Commercial oil resources, basic processing of fats and oils - oil extraction, expeller pressing and solvent extraction, degumming, refining, bleaching, hydrogenation, fractional crystallization, inter-esterification, glycerolizes, molecular distillation, plasticizing and tempering.

Preparation of protein concentrates and isolates and their use in high protein foods, fermented and traditional products.

Unit-III (10 Hrs.)

Fat substitutes and mimetics.

Common pulses produced in the country.

Soybean: processing and utilization.

Milling methods for pulses, home scale commercial and recent methods with equipment.

Unit-IV (10 Hrs.)

Anti-nutrients in pulses and modes of elimination.

Main processing methods: Cooking, germination, sprouting, fermentation, roasting, puffing, frying and extrusion cooking etc.

Products from legumes and uses: Starch, flour, protein concentrates and isolates.

Traditional food products made from pulses.

Recommended Books

1. R.J. Hamilton and A. Bharti, 'Fats and Oils: Chemistry and Technology', Applied Science, London.
2. D.K. Salunkhe, J.K. Chavan, R.N. Adsule and S.S. Kadam, 'World Oilseeds: Chemistry, Technology and Utilization', VNR, New York, U.S.A.
3. I.A. Wolf, 'Handbook of Processing and Utilization in Agriculture', CRC Press, Florida, U.S.A.

TECHNOLOGY OF EGG, MEAT, FISH AND POULTRY

Subject Code: MFOT1-415

L T P C
3 1 0 4

Duration: 45 Hrs.

Unit-I (11 Hrs.)

Status and scope of meat industry in India.

Structure and physico-chemical properties of muscle.

Meat: Composition and nutritive value, conversion of muscle into meat, environmental and animal production factors that affect meat quality, post mortem changes in meat, rigor mortis, cold shortening, pre-rigor processing.

Unit-II (11 Hrs.)

Aging of meat, meat tenderization- natural and artificial methods.
Properties of fresh meat-water holding capacity, color, palatability.
Cooking methods for meat.

Storage and Preservation of Meat: Chilling, Freezing, Curing, Smoking, Dehydration, Canning.
Spoilage of meat.

Unit-III (12 Hrs.)

Restructured meat products, meat analogs.
Meat industry by products: Importance and applications.
Fish: Factors affecting quality of fresh fish, fish dressing, chilling, freezing, salting and canning of fish.
Manufacturing of fish oil, fish protein concentrate, fish meal.
By-products of fish industry, their technology of utilization.

Unit-IV (11 Hrs.)

Egg: Structure, composition, nutritive and functional properties.
Quality of Egg: Internal quality evaluation, egg candling, egg grading, microbial spoilage of eggs, preservation and storage methods for eggs.
Egg powder.
Packaging and transportation of eggs.
Poultry: Types, chemical and nutritive value of poultry meat, poultry dressing and slaughtering methods, preservation, grading and packaging of poultry meat.

Recommended Books

1. W.J. Stadelman and J. Owen, 'Egg Science & Technology', AVI Publishing Company, INC. Westport, U.S.A.
2. R.A. Lawrie and D. Ledward, 'Lawrie's Meat Science', Woodhead Publishers, UK.
3. G. Mead, 'Poultry Meat Processing and Quality', Woodhead Publishers, UK.
4. P.C. Panda, 'Text Book on Egg and Poultry Technology', Vikas Publishers, Chennai, India.

TECHNOLOGY OF MILK AND MILK PRODUCTS

Subject Code: MFOT1-416

L T P C
3 0 0 3

Duration: 38 Hrs.

Unit-I (10 Hrs.)

Dairy Industry in India: Scope, strengths and opportunities for dairy industry.
Milk: Definition, composition and nutritive value, factors affecting composition of milk.
Physicochemical properties and nutritive value of milk.
Liquid Milk Processing: filtration/clarification, standardization, pasteurization (LTLT, HTST, UHT), homogenization.
Microbiology of milk

Unit-II (10 Hrs.)

Technology of Recombined and Reconstituted Milk: Composition, process of manufacture, defects.
Technology of Condensed and Evaporated Milk: process of manufacture, defects (their causes and prevention).

Technology of Milk Powders (WMP, SMP): process of manufacture, defects (their causes and prevention), instantization of milk powder.

Technology of Indigenous Milk Products: Dahi, butter, ghee, channa, paneer etc.

Unit-III (8 Hrs.)

Technology of Cheese: classification, composition, Nutritive value, process of manufacture of cheddar, mozzarella, cottage and processed cheese, defects (their causes and prevention).

Technology of frozen milk products: process of manufacture, defects (their causes and prevention).

Unit-IV (10 Hrs.)

Milk and Milk Product Standards and Legislations in India: Grading of milk and criterion of grading, reconstituted milk, synthetic milk.

Membrane Processing of Milk: types of membranes, applications of reverse osmosis, ultrafiltration and microfiltration in dairy industry.

Milk adulteration, synthetic milk and quality control in dairy industry. By products of dairy industry and their utilization. Imitation dairy products.

Recommended Books:

1. Sukumar, De 'Outlines of Dairy Technology', Oxford University Press, UK.
2. G. Smith, 'Dairy processing improving quality', Woodhead Publishers, New Delhi, India.
3. A.T. Andrews and J. R. Varley, 'Biochemistry of Milk Products' Woodhead Publishers, New Delhi, India.
4. R. Early, 'Technology of Dairy Products', Springer Science & Business Media, Germany.
5. R.P. Aneja, B.N. Mathur, R.C. Chandan and A.K. Banerjee, 'Technology of Indian Milk Products', Dairy India Publishers, New Delhi, India.

FOOD ANALYSIS AND INSTRUMENTATION

Subject Code: MFOT1-417

L T P C

Duration: 46 Hrs.

3 1 0 4

Unit-I (11 Hrs.)

Introduction to food analysis, types of samples and sampling techniques, storage and preservation of samples, expression of results.

Proximate Analysis of Foods: Principles of moisture, fat, protein, carbohydrates, crude fiber and vitamins in foods.

Unit-II (11 Hrs.)

Sensory Analysis of Foods: Overview of the sensory principles and practices, selection and screening of the sensory panel, types of panel (trained, semi trained), methodology of sensory evaluation: discriminative tests: difference tests, paired comparison, duo trio, triangle; descriptive tests.

Unit-III (12 Hrs.)

Instrumentation in Food Analysis: Principles, types and applications of spectroscopy, photometry, electrophoresis; chromatography and atomic absorption spectrophotometry.

Unit-IV (12 Hrs.)

Instrumentation in Food Analysis: Color measurement in foods; X-ray analysis of foods and its applications; mass spectroscopy; nuclear magnetic resonance (NMR); differential scanning calorimetry (DSC).

Refractometry and ultrasonic in food analysis; texture analysis in foods, sensory versus instrumental analysis of texture, rapid methods of microbial analysis; immunoassays methods.

Recommended Books

1. R.S. Kirk and R. Sawyer, 'Pearson's Composition & Analysis of foods', Longman Scientific and Technical, UK.
2. G.G. Birk, J.G. Herman and K.J. Parker, 'Sensory Properties of Foods', Applied Science, London.

TECHNOLOGY OF ANIMAL PRODUCTS LAB.-VI

Subject Code: MFOT1-418

L T P C

0 0 4 2

1. Determination of specific gravity, total solids (T.S) % and SNF (Solid not fat) % in the given milk sample.
2. Determination of percentage fat in the given sample of milk by Gerber centrifuge method.
3. Determination of titrable acidity (T.A.) and pH of milk.
4. Determination of added Urea in the given sample of milk.
5. Determination of added starch in the given sample of milk.
6. To conduct clot on boiling (COB) and Alcohol – Alizarin test for testing milk quality.
7. Determination of added water in a given sample of milk.
8. Preparation qualitative testing of milk products like chhana, Khoa and Paneer, Ice cream.
9. Determination of added preservatives, neutralizers in the given sample of milk.
10. Estimation of bacterial numbers in a given sample of milk by direct microscopic count in a given sample of milk.
11. Determination of microbiological quality of milk of MBR test.
12. To study dismantling, cleaning and assembling of HTST pasteurizer for milk.
13. Separation of cream by cream separator.
14. Visit to a milk collection/chilling and milk processing plant.
15. Determination of external and internal quality of poultry egg.
16. To study the effect of time, temperature on coagulation properties of egg.
17. Determination of time temperature condition on formation of iron sulphide in egg.
18. Preservation and evaluation of different egg products.
19. Preparation and evaluation of different egg products
20. Preparation of different types of meat products using different methods of preservation.
21. Visit to meat, fish and poultry processing industries.
22. Determination of tenderness and water holding capacity of different meat type.

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2018 BATCH ONWARDS

Semester 1 st		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
HUM0-101	Communicative English	3	1	0	40	60	100	4
BCMC-101	Introduction to Information Technology	3	1	0	40	60	100	4
BCMC-102	Computer Organization	3	1	0	40	60	100	4
BCMC-103	Programming in C Language	3	1	0	40	60	100	4
HUM0-102	Human Value & Professional Ethics	3	1	0	40	60	100	4
BCMC-104	Software Lab.-I (Based on BCMC-101)	0	0	4	60	40	100	2
BCMC-105	Software Lab.-II (Based on BCMC-103)	0	0	4	60	40	100	2
Total		15	5	8	320	380	700	24

Semester 2 nd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC -206	Database Management System	3	1	0	40	60	100	4
BCMC -207	Computer Network	3	1	0	40	60	100	4
BCMC -208	Management Information System	3	1	0	40	60	100	4
BCMC -209	Object Oriented Programming Language in C++	3	1	0	40	60	100	4
BCMC -210	Operating System	3	0	0	40	60	100	3
BCMC -211	Software Lab.-III (Based on BCMC-206)	0	0	4	60	40	100	2
BCMC -212	Software Lab.-IV (Based on BCMC-209)	0	0	4	60	40	100	2
Total		15	4	8	320	380	700	23

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MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2018 BATCH ONWARDS

Semester 3 rd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-313	Software Engineering	3	1	0	40	60	100	4
BCMC-314	Data Structure	3	1	0	40	60	100	4
BCMC -315	Latest Trends in Information Technology	3	1	0	40	60	100	4
BCMC -316	Programming in Java	3	1	0	40	60	100	4
BCMC -317	Environmental Studies and Disaster Management	3	1	0	60	40	100	4
BCMC -318	Software Lab.-V (Based on BCMC-314)	0	0	4	60	40	100	2
BCMC-319	Software Lab.-VI (Based on BCMC-316)	0	0	4	40	60	100	2
Total		15	5	8	320	380	700	24

Semester 4 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-420	Programming with Python	3	1	0	40	60	100	4
BCMC -421	Software Project Management	3	1	0	40	60	100	4
BCMC-422	Linux Operating System	3	1	0	40	60	100	4
BCMC -423	System Programming	3	1	0	40	60	100	4
BCMC-424	Software Lab.-VII (Based on BCMC-420)	0	0	4	60	40	100	2
BCMC-425	Software Lab.-VIII (Based on BCMC-422)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2018 BATCH ONWARDS

Semester 5 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-526	Data Analytics	3	1	0	40	60	100	4
BCMC-527	Artificial Intelligence	3	1	0	40	60	100	4
BCMC-528	Object Oriented Analysis and Design using UML	3	1	0	40	60	100	4
BCMC-529	Web Application Development	3	1	0	40	60	100	4
BCMC-530	Software Lab.-IX (Based on BCMC-528)	0	0	4	60	40	100	2
BCMC-531	Software Lab.-X (Based on BCMC-529)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

Semester 6 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-632	Computer Graphics and Multimedia Animation	3	1	0	40	60	100	4
BCMC-633	Network Security	3	1	0	40	60	100	4
BCMC-634	Mobile Applications	3	1	0	40	60	100	4
BCMC-635	Software Lab- XI (Based on BCMC-632)	0	0	4	60	40	100	2
BCMC-636	Software Lab-XII (Based on BCMC-634)	0	0	4	60	40	100	2
BCMC-637	Software Project Development	0	0	8	60	40	100	4
Total		9	3	16	300	300	600	20

MRSPTU

COMMUNICATIVE ENGLISH

Subject Code: HUM0-101

**L T P C
3 1 0 4**

Durations: 45 Hrs.

Objectives and Expected Outcomes: The objectives of this course are to make students understand that both oral & written communications are equally important. The students should be comfortable with both verbal & written communications.

UNIT-I (10 Hrs.)

English Language: Sentence, Parts of speech, Tenses, Active passive voice, Direct Indirect speech, Creative writing & vocabulary, Comprehension passage, reading of biographies of at least 10 IT business personalities (can be a home assignment or classroom reading).

UNIT-II (13 Hrs.)

Business Communications: Types, Medias, Objectives, Modals, Process, Importance Understanding Barriers to communication & ways to handle and improve barriers.

UNIT-III (12 Hrs.)

Presentation Skills: Its Purpose in business world, how to find material for presentation, how to sequence the speech with proper introduction and conclusion, how to Prepare PPT & Complete set of required body language while delivering presentation.

Reading & Writing Skills: Importance of reading and writing, improving writing skills through understanding and practicing Notice, E-mail, Tenders, Advertisement, formal letter.

UNIT-IV (10 Hrs.)

Listening Skills: Its importance as individual and as a leader or as a worker, its types, barriers to listening & remedies to improve listening barriers.

Non-verbal Communication: understanding what is called non-verbal communication, its importance as an individual, as a student, as a worker and as a leader, its types.

Recommended Books:

1. M.V. Rodriguez, 'Effective Business Communication'.
2. Meenakshi Raman, Parkash Singh, 'Business Communication' Paperback Edition, Oxford University Press.

INTRODUCTION TO INFORMATION TECHNOLOGY

Subject Code: BCMC-101

**L T P C
3 1 0 4**

Durations: 45 Hrs.

Objectives and Expected Outcomes: This course will enable the student to gain an understanding of the core concepts and technologies which constitute Information Technology. The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology.

UNIT- I (10 Hrs.)

Computer Fundamentals: Block structure of a computer, characteristics of computers, problem solving with computers, generations of computers, and classification of computers on the basis of capacity, purpose, and generation.

Number System: Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, representation of characters, integers and fractions.

Binary Arithmetic: Addition, subtraction and multiplication.

UNIT-II (13 Hrs.)

Memory Types: Magnetic core, RAM, ROM, Secondary, Cache, Bubble Memory.

Input and Output Units: Keyboard, Mouse, Monitor (CRT and LCD): Light pen, joystick, Mouse, Touch screen; OCR, OMR, MICR

Overview of storage devices: Floppy disk, hard disk, compact disk, tape. Printers: Impact, non-impact, working mechanism of Drum printer, Dot Matrix printer, Inkjet printer and Laser printer.

Computer Languages: Machine language, assembly language, higher level language, 4GL.

Introduction to Compiler, Interpreter, Assembler, Assembling, System Software, Application Software.

UNIT- III (12 Hrs.)

Operating System: Batch, multi-programming, time sharing, network operating system, on-line and real time operating system, Distributed operating system, multi-processor, Multi-tasking.

Graphical OS: Fundamentals of windows, types of windows, anatomy of windows, windows explorer, customizing windows, control panel, taskbar setting, Network Neighborhood.

Personal Productivity Software:

Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.

Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs.

Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.

UNIT –IV (10 Hrs.)

Computer Network and Communication: Network types, network topologies, network communication devices, physical communication media.

Internet and its Applications: E-mail, TELNET, FTP, World Wide Web, Internet chatting; Intranet, Extranet, Gopher, Mosaic, WAIS.

Recommended Books:

1. D. H. Sanders, 'Computers Today', 4th Edn., McGraw Hill, **1988**.
2. V. Rajaraman, 'Fundamentals of Computers', 2nd Edn., Prentice Hall of India, New Delhi, **1996**.
3. Satish Jain, 'Information Technology', BPB, Paperback Edn., **1999**.
4. David Cyganski, John A. Orr, 'Information Technology Inside and Outside', Pearson Education, Paperback Edn., **2002**.
5. B. Ram, 'Computer Fundamentals', 3rd Edn., Wiley, **1997**.
6. Chetan Srivastva, 'Fundamentals of Information Technology', 3rd Edn., Kalayani Publishers.
7. Larry long & Nancy long, 'Computers', 12th Edn., Prentice Hall.

COMPUTER ORGANIZATION

Subject Code: BCMC-102

**L T P C
3 1 0 4**

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Components of a Computer: Processor, Memory, Input-Output Unit, Historical Computer

Architecture: First, Second, Third, Fourth Generation and Beyond, Difference between Organization and Architecture, Hardware Software Interaction.

UNIT-II (13 Hrs.)

Instruction Types: Three-address, Two-address, One-address, Zero-address; Addressing Modes, Interrupts. **Digital Logic Circuits:** Design of Combinational Circuits: Half Adder, Full Adder.

UNIT-III (12 Hrs.)

Sequential Circuits: SR, JK, D, T Flip-Flop, Excitation Tables, State Diagram, State Table, Binary Counter

Memory: Hierarchical Memory Structure, RAM, ROM, Cache, Auxiliary Memory

UNIT-IV (10 Hrs.)

CPU Architecture: Processor, Register Organization, ALU, CU, Memory, Input/Output; Instruction Implementation: Instruction Cycle, Fetch-Execute Cycle, Instruction codes, op-codes, Timing and Control, Memory reference instructions.

Recommended Books:

1. Jyotsna Sengupta, 'Fundamentals of Computer Organization and Architecture', Nu Tech Books, Deep and Deep Publications, New Delhi, 2009,
2. M. Morris Mano, 'Digital Logic and Computer Design', Prentice Hall of India.
3. J.P. Hayes, 'Computer Organization and Architecture', Tata McGraw Hill.
4. William Stallings, 'Computer System Architecture', PHI.

PROGRAMMING IN C LANGUAGE

Subject Code: BCMC-103

L T P C
3 1 0 4

Durations: 45 Hrs.

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write algorithm for solutions to various real-life problems. Converting the algorithms into computer programs using C language.

UNIT-I (10 Hrs.)

Algorithm and Programming Development: Steps in development of a program, Flow charts, Algorithm Development, Program Debugging, Compilation and Execution.

Fundamentals of 'C': I/O statements, Assignment Statements, Constants, Variables, Operators and Expressions, Standards and Formatted statements, Keywords, Data Types and Identifiers.

UNIT-II (13 Hrs.)

Control Structures: Introduction, Decision making with if – statement, if-else and Nested if, while and do-while, for loop. Jump statements: break, continue, goto, switch Statement

Functions: Introduction to Functions, Function Declaration, Function Categories, Standard Functions, Parameters and Parameter Passing, Call – by value/reference, Recursion, Global and Local Variables, Storage classes.

UNIT- III (12 Hrs.)

Arrays: Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Matrices, Strings, String handling functions.

Structure and Union: Declaration of structure, Accessing structure members, Structure Initialization, Arrays of structure, nested structures, Unions

UNIT-IV (10 Hrs.)

Pointers: Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers, Pointers and Arrays

Files: Introduction, creating a data file, opening and closing a data file, processing a data file.

Preprocessor Directives: Introduction and Use, Macros, Conditional Preprocessors, Header Files

Recommended Books:

1. Yashvant P. Kanetkar, 'Let us C', 7th Edn., BPB Publications, New Delhi.
2. E. Balagurusami, 'Programming in ANSI C', 4th Edn., Tata McGraw Hill.
3. Byron S. Gottfried, 'Programming in C', 2nd Edn., McGraw Hills.
4. Kernighan & Richie, 'The C Programming Language', 2nd Edn., PHI Publication.
5. R. Lafore, 'Object Oriented Programming', 3rd Edn., Galgotia Publications.
6. R.S. Salaria, 'Problem Solving and Programming in C', 2nd Edn.

HUMAN VALUES AND PROFESSIONAL ETHICS

Subject Code: HUM0-102

L T P C

Durations: 45 Hrs.

3 1 0 4

Objectives and Expected Outcomes: To help the students to discriminate between valuable and superficial in the life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life – this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability, it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing) – it concentrates on providing to its students the skills to do things. In other words, it concentrates on providing “How to do” things. The aspects of understanding “What to do” or “Why something should be done” is assumed. No significant cogent material on understanding is included as a part of the curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course is an effort to fulfill our responsibility to provide our students this significant input about understanding. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. It has been experimented at IITH, IITK and UPTU on a large scale with significant results.

UNIT-I (10 Hrs.)

Course Introduction-Need, Basic Guidelines, Content and Process for Value Education:

Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration– what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self- exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Understanding Harmony in the Human Being – Harmony in Myself! Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’. Understanding the needs of Self (‘I’) and ‘Body’ – *Sukh* and *Suvidha*. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer). Understanding the characteristics and activities of ‘I’ and harmony in ‘I’. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure *Sanyam* and *Swasthya*.

Understanding Harmony in the Family and Society-Harmony in Human- Human Relationship:

Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship. Understanding the meaning of *Vishwas*; Difference between intention and competence. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha*)- from family to world family!

UNIT-II (13 Hrs.)

Understanding Harmony in the Nature and Existence – Whole existence as Co-existence:

Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order. Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers At the level of society: as mutually enriching institutions and organizations

Recommended Books:

1. R.R. Gaur, R. Sangal, G.P. Bagaria, 'A Foundation Course in Value Education', **2009**,
2. Ivan Illich, 'Energy & Equity', The Trinity Press, Worcester, and HarperCollins, USA, 1974,
3. E.F. Schumacher, 'Small is Beautiful: A Study of Economics as if People Mattered, Blond & Briggs', Britain, **1973**.
4. A. Nagraj, 'Jeevan Vidya ek Parichay', Divya Path Sansthan, Amarkantak, 1998.
5. Sussan George, 1976, 'How the Other Half Dies', Penguin Press, 1976, Reprinted 1986, 1991.
6. P.L. Dhar, R.R. Gaur, 'Science and Humanism', Commonwealth Purblishers, 1990.
7. A.N. Tripathy, 'Human Values', New Age International Publishers, 2003.
8. Subhas Palekar, 'How to Practice Natural Farming', Pracheen (Vaidik) Krishi Tantra Shodh, Amravati, 2000.
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 'Limits to Growth – Club of Rome's Report', Universe Books, 1972.
10. E.G. Seebauer & Robert L. Berry, 'Fundamentals of Ethics for Scientists & Engineers', Oxford University Press, 2000.
11. M. Govindrajran, S. Natrajan & V.S. Senthil Kumar, 'Engineering Ethics (including Human Values)', Prentice Hall of India Ltd, Eastern Economy Edn.
12. B.P. Banerjee, 'Foundations of Ethics and Management', Excel Books, 2005.
13. B.L. Bajpai, 'Indian Ethos and Modern Management', New Royal Book Co. Lucknow. Reprinted, 2004, 2008.

SOFTWARE LAB-I (BASED ON BCMC-101)

Subject Code: BCMC-104

L T P C

0 0 4 2

1. Familiarizing with PC and WINDOWS commands,
2. File creation,
3. Editing
4. Directory creation.
5. Mastery of DOS internal & external commands.
6. Learning to use MS Office: MS WORD, MS EXCEL & MS PowerPoint.

SOFTWARE LAB-II (BASED ON BCMC-103)

Subject Code: BCMC-105

L T P C

0 0 4 2

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write programs for solving various real- life problems.

1. **Input-Output Statements:** formatted and non-formatted statements.
2. **Decision Making:** switch, if-else, nested if, else-if ladder, break, continue, goto
3. **Loops:** while, do-while, for
4. **Functions:** definition, declaration, variable scope, parameterized functions, return statement, call by value, call by reference, recursive functions.
5. **Arrays:** Array declarations, Single and multi-dimensional, memory limits, strings and string functions.
6. **Files:** Creation and editing of various types of files, closing a file (using functions and without functions).

DATABASE MANAGEMENT SYSTEM

Subject Code: BCMC-206

L T P C

Durations: 45 Hrs.

3 1 0 4

UNIT-I (10 Hrs.)

Introduction to Data, Field, Record, File, Database, Database management system. Structure of database system, Advantage and disadvantage, levels of database system, Relational model, hierarchical model, network model, comparison of these models, E-R diagram, different keys used in a relational system, SQL.

UNIT-II (13 Hrs.)

DBA, responsibilities of DBA, Relational form like 1NF, 2NF, 3NF, BCNF, 4th NF, 5th NF, DBTG, concurrency control and its management, protection, security, recovery of database.

UNIT-III (12 Hrs.)

SQL: Introduction to SQL-DDL, DML, DCL, join methods & sub query, Union Intersection, Minus, Tree Walking, Built in Functions, views.

UNIT- IV (10 Hrs.)

Security amongst users, Sequences, Indexing Cursors- Implicit & Explicit, Procedures, Functions & Packages Database Triggers. Big Data: Introduction to Big Data and Analytics, Introduction to NoSQL

Recommended Books:

1. C.J. Date, 'Introduction to Database System'.
2. B.C. Desai, 'Database Management System'.
3. Korth, 'Database Concept'.
4. 'Simplified Approach to DBMS', Kalyani Publishers.
5. Ivan Bayross, 'Oracle – Developer – 2000'.
6. Database System Concepts & Oracle (SQL/PLSQ) – AP Publishers.

COMPUTER NETWORK

Subject Code: BCMC-207

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction: Network Definition, Basic Components of a Network, Network types and topologies, Uses of Computer Networks, Network Architecture. Transmission Media: Coaxial cable, twisted pair cable, fibre optics & satellites. OSI reference model, TCP/IP reference model, comparison of OSI and TCP reference model.

UNIT-II (13 Hrs.)

Introduction to Analog and Digital Transmission: Telephone system, Modems, Types of modems, pulse code modulation. **Transmission & Switching:** Multiplexing, circuit switching, packet switching, hybrid switching, ISDN service transmission.

UNIT-III (12 Hrs.)

Local Area Network Protocols: CSMA Protocols, BRAP, MLMA, IEEE standards 802, Token Bus, Token Ring, FDDI. **Data Link Layer Design Issues:** Services provided to Network layer framing, error control, flow control, link management. Error detection & correction, Elementary Datalink Protocols. **Design Issues of Network Layer:** Services provided to transport layer, routing, connection, internet & World Wide Web.

UNIT-IV (10 Hrs.)

Network Security and Privacy: Brief Introduction to Cryptography. **Network Services:** File transfer, Access & Management, Electronic Mail, Remote login

Recommended Books:

1. A.S. Tannanbum, 'Computer Networks', 3rd Edn., Prentice Hall, 1992.
2. Stallings, William, 'Local Networks: An Introduction', Macmillan Publishing Co.
3. Stallings, William, 'Data Computer Communication', Macmillan Publishing Co.

MANAGEMENT INFORMATION SYSTEM

Subject Code: BCMC-208

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT- I (10 Hrs.)

Management Information System: Meaning and definition, Role of information system, Nature and scope of MIS.

Information and System Concepts: Definition and types of information, Information quality, dimensions of information, value of information, general model of human as an information processor. System related concepts, elements of a system, and types of system.

UNIT- II (13 Hrs.)

Role and Importance of Management: Introduction, levels and functions of management. Structure and classification of MIS, Components of MIS, Framework for understanding MIS: Robert Anthony's hierarchy of management activity, Information requirements and levels of management.

UNIT- III (12 Hrs.)

Decision making concept, types of decisions, methods of choosing among alternatives, Role of MIS in decision making.

Simon's model of decision making, Structured and unstructured decisions.

UNIT- IV (10 Hrs.)

Development of MIS: Stages in the development of MIS, System development approaches: Waterfall model, Prototyping, Iterative enhancement model, Spiral model.

Applications of information systems in Functional areas: Marketing MIS, Financial MIS, Production MIS, Personnel MIS.

Decision Support Systems: Definition and characteristics, MIS versus DSS, Tools and Models for decision support.

Recommended Books:

1. D.P. Goyal, 'Management Information Systems: Managerial Perspectives', Macmillan India Ltd.
2. Robert G. Murdick, Joel E. Ross, James R. Claggett, 'Information Systems for Modern Management', Prentice Hall of India Pvt. Ltd.
3. Gordon B. Davis, M.H. Olson, 'Management Information Systems: Conceptual Foundations, Structure & Development', McGraw Hill Book Co.
4. W.S. Jawadekar, 'Management Information Systems', Tata McGraw Hill Publishing Co.

OBJECT ORIENTED PROGRAMMING LANGUAGE USING C++

Subject Code: BCMC-209

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT- I (10 Hrs.)

Characteristics of Object Oriented Programming: Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, Code Extensibility and Reusability, User defined Data Types.

Introduction to C++: Identifier, Keywords, Constants, And Operators: Arithmetic, relational, logical, And conditional and assignment. size of operator, Operator precedence and associativity.

UNIT- II (13 Hrs.)

Classes and Objects: Class Declaration and Class Definition, defining member functions, making functions inline, Nesting of member functions, Members access control. this pointer.

Objects: Object as function arguments, array of objects, functions returning objects, Const member functions.

Destructors: Properties, Virtual destructors. Destroying objects. Rules for constructors and destructors. Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes.

UNIT- III (12 Hrs.)

Static data members and Static member functions. Friend functions and Friend classes, Constructors: properties, types of constructors (Default, parameterized and copy), Dynamic constructors, multiple constructors in classes.

Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function redefining, constructors in derived class.

Types of Inheritance: Single, Multiple, Multilevel and Hybrid. Types of base classes: Direct, Indirect,

Virtual, Abstract. Code Reusability.

UNIT- IV (10 Hrs.)

Polymorphism: Methods of achieving polymorphic behavior.

Operator overloading: overloading binary operator, overloading unary operators, rules for operator overloading, operator overloading using friend function. Function overloading: early binding, Polymorphism with pointers, virtual functions, late binding, pure virtual functions and abstract base class. Introduction to File Handling.

Recommended Books:

1. E. Balagurusamy, 'Object Oriented Programming with C++', Tata McGraw Hill.
2. Deitel and Deitel, 'C++ How to Program', Pearson Education.
3. Herbert Schildt, 'The Complete Reference C++', Tata McGraw Hill.
4. Robert Lafore, 'Object Oriented Programming in C++', Galgotia Publications.
5. Bjarne Strastrup, 'The C++ Programming Language', Addison-Wesley Publication Co.
6. Stanley B. Lippman, Josee Lajoie, 'C++ Primer', Pearson Education, 2002.

OPERATING SYSTEM

Subject Code: BCMC-210

L T P C

Durations: 45 Hrs.

3 1 0 4

UNIT- I (10 Hrs.)

Introduction: Definition, Early Systems, Simple Batch system, Multi programmed Batch. Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, Real-time Systems.

UNIT- II (13 Hrs.)

Processes: Process concepts, Process Scheduling, Threads. CPU-Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation, Process Synchronization: Critical – section problem, semaphores, classical problem of synchronization.

UNIT- III (12 Hrs.)

Memory Management: Background, Logical v/s Physical address space, swapping, continuous allocation, paging, segmentation. Virtual Memory: Background, demand paging, performance of demand paging, page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT- IV (10 Hrs.)

Secondary Storage Structures: Disk structures, Disk scheduling, Disk Reliability. Deadlocks: System Model, Deadlock characterization, methods for handling deadlocks, Deadlocks Prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to deadlock handling.

Recommended Books:

1. Silberschatz Galvin, 'Operating System Concepts', 4th Edn., Addison Wesley,
2. Crowley, 'Operating Systems, A Design Oriented Approach', Tata McGraw Hill.
3. Dietel, 'Operating Systems', 2nd Edn., Addison Wesley.

SOFTWARE LAB.-III (BASED ON BCMC-201)

Subject Code: BCMC-211

L T P C

Durations: 45 Hrs.

3 1 0 4

Operational Knowledge and Implementation of Database using SQL.

SOFTWARE LAB-IV (BASED ON BCMC-204)

Subject Code: BCMC-212

**L T P C
3 1 0 4**

Durations: 45 Hrs.

Operational Knowledge and Implementation of numerical methods & statistical Techniques using C++ Language.

MRSPTU

MRSPTU SKILL CERTIFICATE E IN COMPUTER PROFICIENCY 2018 BATCH ONWARDS

Code	Units	Study Scheme Total Hrs.			Marks In Evaluation Scheme								Total Marks
					Internal Assessment			External Assessment					
		Th	Pr	Hrs.	Th	Pr	Total	Th	Hrs.	Pr	Hrs.	Total	
CCOP1-101	*Communication Skills	8	24	1	25	50	75	25	1	75	3	100	175
CCOP1-102	Computer Fundamentals	16	48	3	25	50	75	25	1	75	3	100	175
CCOP1-103	PC Assembling, Disassembling And Networking	16	112	5	25	75	100	25	1	75	3	100	200
CCOP1-104	Installation and Working of Operating System.	16	80	4	25	50	75	25	1	100	3	125	200
CCOP1-105	Office Automation	16	80	4	25	50	75	25	1	100	3	125	200
CCOP1-106	Fundamentals of Internet and Webpage Development	16	80	4	25	50	75	25	1	100	3	125	200
CCOP1-107	# Student Centered Activities (SCA)	-	48	2	-	25	25	-	-	-	-	-	25
CCOP1-108	+ 4 Weeks Industrial Training	-	-	4	-	-	-	-	-	100	3	100	100
Total		88	472	27	150	350	500	150	-	625	-	775	1275

* Common with other certificate programmes

SCA will comprise of co-curricular activities like extension lectures on entrepreneurship, environment and energy conservation, sports, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities etc.

+ **Industrial Training**

After theory/labs examination, the students will go for training in a relevant industry/field organization for a minimum period of 4 weeks and will prepare a diary. Final Viva-Voce of the training will be conducted after the submission of student's diary report of the training. Final evaluation will be done by concerned instructor in the presence of one industrial representative from the related programme/trade.

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

Subject Code: CCOP1-101 - COMMUNICATION SKILLS	
LEARNING OUTCOMES:	
<p>After undergoing this unit, the students will be able to:</p> <ul style="list-style-type: none"> • Speak confidently. • Overcome communication barriers. • Write legibly and effectively. • Listen in proper prospective. • Read various genres adopting different reading techniques. • Respond to telephone calls effectively. 	
Practical	Theory
(24 Hours)	(08 Hours)
	<p>Basics of Communication</p> <ul style="list-style-type: none"> • Process of communication • Types of communication - formal and informal, oral and written, verbal and non-verbal • Objectives of communication • Essentials of communication • Barriers to communication <p align="right">(1 hour)</p>
<ul style="list-style-type: none"> • Looking up words in a dictionary (meaning and pronunciation) <p align="right">(2 hours)</p>	<p>Functional Grammar and Vocabulary</p> <ul style="list-style-type: none"> • Parts of speech • Tenses • Correction of incorrect sentences <p align="right">(2 hours)</p>
<ul style="list-style-type: none"> • Self and peer introduction • Greetings for different occasions <p align="right">(1 hour)</p>	<p>Listening</p> <ul style="list-style-type: none"> • Meaning and process of listening • Importance of listening • Methods to improve listening skills <p>Speaking</p> <ul style="list-style-type: none"> • Importance • Methods to improve speaking • Manners and etiquettes <p align="right">(2 hours)</p>
<ul style="list-style-type: none"> • Newspaper reading <p align="right">(1 hour)</p>	<p>Reading</p> <ul style="list-style-type: none"> • Meaning • Techniques of reading: skimming, scanning, intensive and extensive reading <p align="right">(1 hour)</p>

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

<ul style="list-style-type: none">• Vocabulary enrichment and grammar exercises• Exercises on sentence framing accurately (6 hours)	Functional Vocabulary <ul style="list-style-type: none">- One word substitution- Commonly used words which are often misspelt- Punctuation- Idioms and phrases (2 hours)
<ul style="list-style-type: none">• Reading aloud articles and essays on current and social issues• Comprehension of short paragraph (5 hours)	
<ul style="list-style-type: none">• Write a short technical report• Letter writing (3 hours)	
<ul style="list-style-type: none">• Participate in oral discussion• Respond to telephonic calls effectively• Mock interview (6 hours)	

Means of Assessment

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Laboratory and practical work
- Viva-voce

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

Subject Code: CCOP1-102 - COMPUTER FUNDAMENTALS	
LEARNING OUTCOMES: After undergoing this unit, the students will be able to:	
<ul style="list-style-type: none"> • Operate computer system and various peripherals. • Work on Windows control panel. • Work on search engines • Communicate through emails, send and receive files through emails. 	
Practical	Theory
(48 Hours)	(16 Hours)
<ul style="list-style-type: none"> • Identify various peripherals of a computer system such as Printers, keyboard, mouse, scanners, MODEM, speakers, microphone, projectors, monitors and other display devices. • identify various cables and connectors used. • Draw and explain block diagram of a computer system with peripherals. <p align="right">(10 hours)</p>	<ul style="list-style-type: none"> • Introduction to various input & output devices. <p align="right">(3 hours)</p>
<ul style="list-style-type: none"> • Identifying Motherboard, various cards, memory slots, microprocessor and other important chips. <p align="right">(5 hours)</p>	<ul style="list-style-type: none"> • Define hardware and software. Define memory and its types: primary & secondary memory. Measurements of memory: bit, byte, MB, GB, TB, etc) • Introduction to RAM and ROM. <p align="right">(5 hours)</p>
<ul style="list-style-type: none"> • Identify various ports, HDD, CD drive, DVD drives and their connectors. <p align="right">(3 hours)</p>	<ul style="list-style-type: none"> • Differentiate between HDD, CD, DVD and other drives(ZIP) <p align="right">(2 hours)</p>
<ul style="list-style-type: none"> • Start and shutdown a PC. • Use various icons and buttons. • Working with windows. <p align="right">(4 hours)</p>	
<ul style="list-style-type: none"> • Making Files and folders in Windows. • Coping folders to auxiliary memory. • Setting up parental controls in Windows. <p align="right">(6 Hours)</p>	
<ul style="list-style-type: none"> • Work on various options of control panel. <p align="right">(10 hours)</p>	

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

<ul style="list-style-type: none">• Identify various browser on internet• Create an email id. Receive and send mails with attachments-Zip and Unzip files. <p style="text-align: right;">(6 hours)</p>	<ul style="list-style-type: none">• Explain internet. Discuss various applications of internet.• Introduction of various browsers. <p style="text-align: right;">(4 hours)</p>
<ul style="list-style-type: none">• Working on search engines.• Search relevant topics and making an assignment of the same. <p style="text-align: right;">(4 hours)</p>	<ul style="list-style-type: none">• Introduction to search engines <p style="text-align: right;">(2 hours)</p>

Means of Assessment

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Laboratory and practical work
- Viva-voce

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

Subject Code: CCOPI-103 - PC ASSEMBLING, DISSEMBLING AND NETWORKING

LEARNING OUTCOMES:

After undergoing this unit student shall be able to:

- Demonstrate the assembling and dissembling of a PC.
- Install and configure of network elements on a network.
- Setup basic steps to ensure network security.
- Protect the system from virus and removing virus.

PRACTICAL	THEORY
(112 Hours)	(16 Hours)

<p>Assemble and Disassemble a PC (28 hrs)</p> <ul style="list-style-type: none"> • Steps for assembling a PC and commonly used devices such as installing a SMPS in a cabinet, fixing a processor in a mother board, installing RAM in a motherboard, pinning a cooling fan in a mother board. Demonstrate all electrical and other safety precautions. • Fix a Hard drive and DVD and connect the data and power cables. • Connect the cables from the SMPS to motherboard, hard disc, drives etc. Establishing data connection to motherboard, hard disc, drives. • Disassemble a PC with proper safety precautions. 	<ul style="list-style-type: none"> • Punching practice in IO Box and patch panel.
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<p>Components of the Computer Network, Crimping, punching and cabling (24 hrs)</p> <ul style="list-style-type: none"> • Familiarization with various network devices, connectors and cables. • Make a layout of network. • Crimping practice with straight and cross CAT 6 cables. 	
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- Introduction to computers, classification, generations, applications. Basic blocks of a digital computer. b) Hand Tools Basics and Specifications.
 - a) Types of cabinets,
- Precautions to be taken while removing and reconnecting cables
(2 hrs)

- Introduction to Computer Network - Advantages of Network , peer-to-peer and Client/server Network.
- Network Topologies - Star, Ring ,Bus, Tree ,Mesh , Hybird.
- Type of networks – Local area network (LAN), Metropolitan area Networks (MAN), Wide Area Networks (WAN) and Internet , Ethernet, Wi-Fi, Bluetooth, Mobile Networking, Wire

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

<ul style="list-style-type: none"> Practice on cabling in a lab with HUB/Switch and IO Boxes and patch panel. Fitting Switch Rack. 	<p>and wireless Networking.</p> <ul style="list-style-type: none"> Difference between Intranet and Internet. Communication media & connectors - unshielded twisted-pair (UTP), shielded twisted-pair (STP), fiber optics and coaxial cable: RJ-11, RJ-45, understanding color coding of CAT6 cable 568A and 568B convention. Introduction to data communication - analogue and digital signal <p align="right">(4 hrs)</p>
<p align="center">Install and Configure a Network (20 hrs)</p> <ul style="list-style-type: none"> Install and Configure a Peer-to-Peer Network using Windows Software. Making cables by crimping. Connect computers using Bluetooth. Connect computers using configuration of routers and switches. Practice on Basic Programmable switch Configuration. 	<ul style="list-style-type: none"> Theory of different OSI Model - the functions of different layers in OSI model Introduction to Network Components - Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc - their functions, advantages and applications. <p align="right">(2 hrs)</p>
<p align="center">IP Addressing and TCP/IP (12 hrs)</p> <ul style="list-style-type: none"> Practice on IP Addressing technique (IPV4/IPV6) subnetting and supernetting the network. 	<ul style="list-style-type: none"> Protocols, TCP/IP, FTP, Telnet etc. Classes of IP Addressing Introduction to setting IP Address (IPV4/IPV6) and Subnet Mask and Supernet Mask. <p align="right">(2 hrs)</p>
<p align="center">Sharing Resource and Internet Connection (12 hrs)</p> <ul style="list-style-type: none"> Sharing Resource and Advance sharing settings. Configuring Internet Connection on a PC using Broadband or Dongle. Use Internet for setting E-mail accounts. 	<ul style="list-style-type: none"> Concept of Internet Architecture of Internet DNS server Internet Access Techniques ISPs example - Broadband/Dialup/Wifi (2 hrs)

<p>Network Protection and troubleshooting (8 hrs)</p> <ul style="list-style-type: none"> • Setting up basic Protection using public keys and MAC address filter. • Integrate wired with wireless network. • Power over Ethernet(PoE). • Troubleshooting wired and wireless network. 	<ul style="list-style-type: none"> • Understanding the use of wired and wireless networks • Protecting a Network • Network performance study and enhancement • Use of wi-fi hot spot with Mobile and laptop. <p style="text-align: right;">(2 hrs)</p>
<p>Network Security (8 hrs)</p> <ul style="list-style-type: none"> • Practice on firewall technologies to secure the network perimeter. • Practice LAN security considerations and implement endpoint and layer 2 security features . • Wi-Fi configuration to implement security considerations. 	<ul style="list-style-type: none"> • Modern Network Security Threats and the basic of securing a network. • Secure Administrative Access, security considerations. Cryptography. • Wi-Fi security considerations. <p style="text-align: right;">(2 hrs)</p>

Means of Assessment

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Laboratory and practical work
- Presentation
- Viva-voce
- Drawing
- Assembly and disassembly

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

Subject Code: CCOPI-104 - INSTALLATION AND WORKING OF OPERATING SYSTEMS

LEARNING OUTCOMES:

After undergoing this unit student will be able to:

- Install Windows OS, drivers and other software.
- Manage disks, files and folders, User Accounts.
- Use and troubleshoot issues using Task Manager.
- Take backup and perform recovery of data.
- Use essential accessories

PRACTICAL	(80 Hours)	THEORY	(16 Hours)
			(4 hrs)
<ul style="list-style-type: none"> • Access and change Setup of BIOS- identifying the different options in BIOS and their purpose, changing the Boot sequence (4 hrs) • Practice on Windows Installation - Install Windows 7/8 or latest version of OS, Mac, Linux and Unix. Installation of drivers to use various components and peripherals. (10 hrs) • Installation of various Application and System software (10 hrs) • Practice on installation of various software such as MS Office, Libre Office, Open Source and utilities, chat, voice and video etc.) (4 hrs) • Checking the proper installation of various softwares. (4 hrs) • Uninstalling the software (4 hrs) • Executing application programs. (4 hrs) • User Management: Add, remove, enable, disable, delete User Accounts) - Setting properties and access rights of different users. 			

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

- Introduction to operating system.
Functions and types of an
operating system
(2 hrs)
- Disk operating system, Concept of GUI.
(1 hr)
- Use of Desktop , My computer,
network neighbourhood / network
places, Recycle bin, task bar, start
menu, tool bar, and menus.
(1 hr)
- Properties of files and folders.
(1 hr)
- Executing application programs.
(2 hrs)
- Properties of connected devices.
(2 hrs)
- Applications under windows accessories.
(2 hrs)
- Windows Help.
(1 hr)
- Control panel, Installed devices and
properties, Utilities for recovering
data from defective/bad hard disks.
(2 hrs)
- Introduction to removable storage
devices, Bulk data storage devices-
magnetic, optical, magneto optical drives,
WORM drives. CD ROM drives, DVD
ROM drive and CD WRITER and

<ul style="list-style-type: none"> • Use and apply various windows power options. Put the system in sleep or hibernate mode. (4 hrs) • Practice on Windows Help. (2 hrs) • Disk Management (Create, delete and format partitions)- Opening disk management tool, identifying primary and secondary partitions. Understanding purpose of various partitions. Accessing files in various format options. Accessing external disks and pen drives, Using Disk management tools- check disk, Disk cleanup, Disk Defragmentation. (10 hrs) • File Management (working with Files and Folders using File Explorer)- Identifying the type of file from extension. Changing properties of a file, Sharing of file. Exploring different options of Windows file explorer. Making file hidden and visible, Recognizing difference between system and user files. Scanning a file using anti-virus. Opening and copying a file from external device to system hard disk, Writing data on CD/DVD. Erasing files from CD/ DVD (10 hrs) • Task Management: use and troubleshoot issues with task manager) - Using various options of task manager. Data Backup and recovery. (2 hrs) • Using essential accessories-notepad, word pad, paint brush, calculators, calendar, character map, system tools, entertainment, Using Multimedia and windows media player and sounds. (4 hrs) • Data Backup and recovery. Creation of Recovery CD – Using the recovery CD, Booting the system in safe mode, booting the system from pen drive, CD Drive, external hard drive. 	
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(4
hr
s)

use different modes of writing on a CD
and Latest trends in backup
devices/media.

(2 hrs)

Means of Assessment

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Laboratory and practical work
- Presentation
- Viva-voce
- Software installation and operation

Subject Code: CCOP1-105 - OFFICE AUTOMATION	
LEARNING OUTCOMES:	
After undergoing this unit student will be able to:	
<ul style="list-style-type: none"> • Use word processing software to create and save document files. • Apply basic formula on data using spreadsheet software. • Create presentation and insert different multimedia objects in presentation file using presentation software. • Create simple table to store data in MS Access software. 	
PRACTICAL	(80 Hours)
THEORY	(16 Hours)
<p>Word Processing Software: MS Office/ Libre Office</p> <ul style="list-style-type: none"> • Familiarization with the Word window components. • Create, save and Edit documents using Word. • Insert headers, footer, watermarks, Bookmarks, Hyperlinks and other objects. • Page setup and Printing Documents using word. • Insert bullets, numbering, border etc. • Inserting and formatting tables and other objects. • Use templates, autocorrect tools, macros and the mail merge tool. • Check spelling and synonyms and antonyms. • Work with Page layout, margin settings and printing documents. • Typing practice using open source typing tutor tools. Speed of typing is 20 w.p.m. • Practice of using shortcut keys. <p style="text-align: right;">(20 hrs)</p>	<p>Word Processing</p> <ul style="list-style-type: none"> • Introduction to the various applications in office. • Introduction to Word features, Office button, toolbars. • Creating, saving and formatting and printing documents using Word. <p style="text-align: right;">(4 hrs)</p>

**MRSPTU SKILL CERTIFICATE IN COMPUTER PROFICIENCY 2018 BATCH
ONWARDS**

<p>Spread Sheet Application: MS Excel</p> <ul style="list-style-type: none"> • Create, Save and Format Excel Spreadsheets. • Use Absolute, Relative and mixed referencing, linking sheets, Conditional formatting etc. • Use Excel functions and formulas of all major categories. • Use various data types in Excel, Sorting, filtering, goal seek and validating data. • Create and format charts. • Import and Export Excel Data. • Perform data analysis using “what if” tools. • Modify Excel Page setup, page break and printing. • Analysing data using charts, data tables, goal seek and scenarios. • Apply and use of Excel and Word in any project. (20 hrs) 	<p>Spread Sheet Application</p> <ul style="list-style-type: none"> • Introduction to Excel features and Data Types. • Cell referencing. Use of functions of various categories, linking Sheets. • Introduction to various functions in all categories of Excel. • Concepts of Sorting, Filtering and Validating Data. • Introduction to Reporting. (4 hrs) <p align="right">(20 hrs)</p>
<p>Working with presentations Using Libre Office/MS Power point</p> <ul style="list-style-type: none"> • Create Slides, Inserting Objects and displaying slide shows in MS Power point/Open Office. • Use different slide layouts. • Animate Slide transitions and Objects. • Insert images, audio, video, chart, tables etc in slides. • Grouping and ungrouping of various objects. • Insert page number, bullets and header/footer etc. • Creating Slide Shows. • Create a simple presentation project using Libre Office. • Take printout in handout format. • Working with Libre Office for word processing and worksheet application. 	

Working with presentations Using
Libre Office/MS Power point

- Introduction to Power Point and its advantages.
- Introduction to the properties and editing of images.
- Fine tuning the presentation and good presentation techniques.

(4 hrs)

<p>Application of MS ACCESS</p> <ul style="list-style-type: none">• Create database and design a simple table in Access.• Enforce Integrity Constraints and modify the properties of tables and fields. <p style="text-align: right;">(20 hrs)</p>	<p>Application of MS ACCESS</p> <ul style="list-style-type: none">• Concepts of Data, Information and Databases.• Rules for designing good tables. Integrity rules and constraints in a table. <p style="text-align: right;">(4 hrs)</p>
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Means of Assessment

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Laboratory and practical work
- Presentation
- Viva-voce

Subject Code: CCOP1-106 -FUNDAMENTALS OF INTERNET AND WEB DEVELOPMENT

LEARNING OUTCOMES:

After undergoing this unit student will be able to:

- Browse web sites using popular browsers and access their history.
- Communicate with other on Internet using e-mail and social networking sites.
- Access various services provided on cloud by different service providers and will be able to upload and download files securely
- Create web pages by inserting different multimedia elements and hyperlinks using HTML and CSS.

PRACTICAL	(80 Hours)	THEORY	(16 Hours)
<p>Internet Concepts (60 hrs)</p> <ul style="list-style-type: none"> • Demonstrate use of various types of internet like Broadband, Wireless, 2G, 3G, 4G, LAN Wi-Fi. etc • Explore different types of browsers like Mozilla Firefox, Google Chrome, Safari and their various functionalities like viewing history and downloads, working cookies, allowing pop-up etc. • Accessing various search engine on web browsers and search content on it. • Demonstrate the use and significance of various types of Domain name space and protocol like SSL, HTTP, HTTPS by using any browser. • Use ftp protocol to transfer any file by using software like FileZilla etc. or use various types of other protocol like telnet, SMTP, POP etc. • Live communication practice using text, audio and video by using various tools like GTALK, SKYPE etc. • Create an ID in Social networking site like Facebook, Twitter etc. and explore it various functions. • Explore various free cloud services like Google drive and drop-box etc. by creating id on it. 			

Internet Concepts (12 hrs)

- Introduction of concept of world wide web (www), internet, web browsers, various types of servers and search engines.
- Concepts of Domain name space.
- Introduction to video chatting tools, VOIP and Social Networking concepts.
- Concept of cloud storage and open source web server.
- Introduction to Internet Security, various threats and attacks,
- Introduction and salient features of cybercrime and copyright law.

<ul style="list-style-type: none"> • Implement security aspects by using firewall. • Identify viruses in the systems and removing them by using anti-viruses. • Configure Outlook mail service in PC/Mobile phones etc. • 	
<p>Introduction to HTML (20 hrs)</p> <ul style="list-style-type: none"> • Create Simple HTML page by using heading tag, body tag, title tag, paragraph tag etc. • Format HTML by using table tag and list tags etc. • Design and develop web page with forms and form controls like radio button, check box, field box, button and other controls. • Create web page using basic features of CSS. • Design and edit webpages by using WYSIWYG web design tool. • Insert image, audio, video, links and marquees text in a web page. 	<p>Introduction to HTML (4 hrs)</p> <ul style="list-style-type: none"> • Concept and introduction of Static and Dynamic Web pages. • Introduction to HTML and various tags in HTML. • Introduction to HTML structure, tags, features and uses.

Means of Assessment

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Laboratory and practical work
- Viva-voce

Subject Code: CCOP1-108 - INDUSTRIAL TRAINING – I (4 Weeks)

The purpose of industrial training is to:

- Develop understanding regarding the size and scale of operations and nature of industrial/field work in which students are going to play their role after completing the courses of study.
- Develop confidence amongst the students through first hand experience to enable them to use and apply institute based knowledge and skills to perform field activities
- Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

It is needless to emphasize further the importance of Industrial Training of students during their one year certificate programme. It is industrial training, which provides an opportunity to students to experience the environment and culture of world of work. It prepares students for their future role as skilled person in the world of work and enables them to integrate theory with practice.

An external assessment of 100 marks have been provided in the study and evaluation scheme of 1st Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

The instructor along with one industrial representative from the concerned trade will conduct performance assessment of students. The components of evaluation will include the following:

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|-------------------------------|-----|
| a) Punctuality and regularity | 20% |
| b) Industrial training report | 50% |