Prof. Y. Rajendra Prasad
M.Pharm., Ph.D

Principal

AU College of Pharmaceutical Sciences
Andhra University,
Visakhapatnam -530 003

Phone: 0891-2844923(O), 09440132537
E mail: aucpsprincipal@andhrauniversity.edu.in
dryrp_au@rediffmail.com

No.AUCPSc/Academic calendar/2021-22

Visakhapatnam
Date: 13-09-2021

To
The Registrar
Andhra University
Visakhapatnam

Sir,

Sub: Academic Calendar for 2021-2022 for B. Pharm., Pharm. D. and M. Pharm. Programmes of AU College of Pharmaceutical Sciences and Pharmacy affiliated colleges – Request for approval – Reg.

****

With reference to the above, I am herewith enclosing the draft of the Academic Calendar for the Academic year 2021-22 for B. Pharm., Pharm. D. and M. Pharm Programmes . I request you to kindly approve and arrange to inform to all the affiliated colleges of Pharmacy.

Thanking you,

Y. R. Prasad
PRINCIPAL 13/09/2021

PRINCIPAL
A.U. College of Pharmaceutical Sciences
Andhra University
VISAKHAPATNAM-530 003

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH 16, Chaitanya Knowledge City,
RAJAHMUNDRY-533 296. (AP)

AU COLLEGE OF PHARMACEUTICAL SCIENCES
ANDHRA UNIVERSITY, VISAKHAPATNAM -530 003
ACADEMIC CALENDAR FOR B. PHARMACY COURSE
FOR THE ACADEMIC YEAR 2020-2021
2021 - 2022

ODD SEMESTER

S No	Class	Odd Semester					
		Date of Commencement of Class work	I[st] mid Semester Examination	2[nd] mid Semester Examination	Date of Closing of Instructions	Date of Commencement of Theory Examination	Dates for Practical Examinations
1	IV/IV B. Pharm. (2018-19 Batch)	13-09-2021	08-11-2021	27-12-2021	30-01-2021	03-01-2022	12-01-2022 to 14-01-2022
2	III/IV B. Pharm. (2019-20 Batch)	22-09-2021	15-11-2021	10-01-2022	18-01-2022	20-01-2022	27-01-2022 to 31-01-2022
3	II/IV B. Pharm. (2020-21 Batch)	17-02-2022	11-04-2022	30-06-2022	03-06-2022	06-06-2022	13-06-2022 to 25-06-2022
4	I/IV B. Pharm. (2021-22 Batch)	-	-	-	-	-	-

EVEN SEMESTER

S. No.	Class	Even Semester					
		Date of Commencement of Class work	I[st] mid Semester Examination	2[nd] mid Semester Examination	Date of Closing of Instructions	Date of Commencement of Theory Examination	Dates for Practical Examinations
1	IV/IV B. Pharm. (2018-19 Batch)	18-01-2022	21-02-2022	28-03-2022	11-04-2022	18-04-2022	05-07-2022 to 12-07-2022
2	III/IV B. Pharm. (2019-20 Batch)	02-02-2022	28-03-2022	25-04-2022	02-05-2022	30-05-2022	06-06-2022 to 10-06-2022
3	II/IV B. Pharm. (2020-21 Batch)	27-06-2022	08-08-2022	19-06-2022	26-09-2022	30-09-2022	10-10-2022 to 14-11-2022
4	I/IV B. Pharm. (2020-21 Batch)	11-10-2021	06-12-2021	24-01-2022	04-02-2022	07-02-2022	14-02-2022 To 17-02-2022

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RAJAHMUNDRY-533 296.

GIET SCHOOL OF PHARMACY

PRINCIPAL

PRINCIPAL
A.U. College of Pharmaceutical Sciences
Andhra University
VISAKHAPATNAM-530 003

AU COLLEGE OF PHARMACEUTICAL SCIENCES
ANDHRA UNIVERSITY, VISAKHAPATNAM -530 003

ACADEMIC CALENDAR FOR PHARM. D & PHARM.D (PB) COURSES FOR THE ACADEMIC YEAR 2021-2022

YEAR END PATTERN

S No	Class	Year End					
		Date of Commence-ment of Class work	I[st] mid Examination	2[nd] mid Examination	Date of Closing of Instructions	Date of Commence-ment of Theory Examination	Dates for Practical Examinations
1	VI/VI Pharm. D (2016-17 Batch)	From 15-09-2022 (Internship)					
2	V/VI Pharm. D (2017-18 Batch)	06-08-2021	27-12-2021	23-05-2022	31-05-2022	**06-06-2022**	13-06-2022 to 18-06-2022
3	IV/VI Pharm. D (2018-19 Batch)	06-08-2021	27-12-2022	23-05-2022	31-05-2022	**18-06-2022**	27-06-2022 to 06-07-2022
4	III/VI Pharm. D (2019-20 Batch)	06-08-2021	27-12-2022	23-05-2022	06-06-2022	**27-06-2022**	11-07-2022 to 18-07-2022
5	II/VI Pharm. D (2020-21 Batch)	15-11-2021	15-02-2022	17-06-2022	20-06-2022	**04-07-2022**	25-07-2022 to 01-08-2022
6	I/VI Pharm. D (2021-22 Batch)	-	-	-	-	-	-

PRINCIPAL
PRINCIPAL
U. College of Pharmaceutical Sciences
Andhra University
VISAKHAPATNAM-530 003

Dr. M.D. DHANA RAJU,
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AU COLLEGE OF PHARMACEUTICAL SCIENCES
ANDHRA UNIVERSITY, VISAKHAPATNAM -530 003

ACADEMIC CALENDAR FOR M. PHARMACY COURSE
FOR THE ACADEMIC YEAR 2021-2022

ODD SEMESTER

S. No.	Class	Odd Semester					
		Date of Commencement of Class work	1st mid Semester Examination	2nd mid Semester Examination	Date of Closing of Instructions	Date of Commencement of Theory Examination	Dates for Practical Examinations
1	I/II M. Pharm. 1st Semester (2021-22 Batch)	-	-	-	-	-	-
2	II/II M. Pharm. 3rd Semester (2020-21 Batch)	14-02-2022 (Project work)	Mid-term Project review & Seminars on selected topics			06-06-2022 to 17-06-2022	

EVEN SEMESTER

S. No.	Class	Even Semester					
		Date of Commencement of Class work	1st mid Semester Examination	2nd mid Semester Examination	Date of Closing of Instructions	Date of Commencement of Theory Examination	Dates for Practical Examinations
1	I/II M. Pharm. 2nd Semester (2020-21 Batch)	14-10-2021	06-12-2022	01-02-2022	05-02-2022	07-02-2022	11-02-2022
2	II/II M. Pharm. 4th Semester (2020-21 Batch)	Thesis submission & Viva-Voce 05-12-2022 to 15-12-2022					

PRINCIPAL 14/10/2021

PRINCIPAL
A.U. College of Pharmaceutical Sciences
Andhra University
VISAKHAPATNAM-530 003

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296: (A.P.)

GIET SCHOOL OF PHARMACY
RAJAHMUNDRY
294 (A.P.)

GIET SCHOOL OF PHARMACY

(SRI KOUNDINYA EDUCATIONAL SOCIETY)

(Affilliated to Andhra University, Approved by AICTE & PCI)

NH-16, Chaitanya Knowledge City, RAJAMAHENDRAVARAM - 533 296. E.G.District., (A.P.)

Tel : 0883 - 2484444, E-mail : gietpharmacy@gmail.com, Website : www.gietpharmacy.in

NAAC ACCREDITED

Academic calendar for the academic year 2021-22

S.no	Name of the Event	Date
1.	Bakrid	21st July2021
2.	Krishna Jayanthi	30thAugust2021
3.	Gandhi Jayanthi	2nd October2021
4.	Teachers' felicitation	5th September2022
5.	M.Pharm mid-term review	27th July 2022
6.	IQAC Meeting	13th September 2021
7.	Dasara vacation	13th October-16th October 2021
8.	Eid Milad-Un-Nabi	19th October2021
9.	Diwali	4th November 2021
10.	Pledge: National Unity Day	30th October2021
11.	Christmas	25th December 2021
12.	New Year	1st January 2022
13.	Republic Day	26th January 2022
14.	Ugadi	2nd April 2022
15.	Birthday Of Babu Jagjivan	5th April 2022
16.	Good Friday	15th April 2022
17.	Bakrid	3rd May 2022
18.	Muharram	9th August 2022
19.	Aids awareness rally	1st December2021
20.	IQAC Meeting	8th December 2021
21.	Swachh Bharat Abyan	24th March2022
22.	Pongal holidays	10th January 2022
23.	IQAC Meeting	21st March 2022
24.	Summer vacation	19th May - 6th June 2022

Dr. M.D. DHANA KA... M.Pharm., Ph.D
Principal.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City,

PRINCIPAL

GIET SCHOOL OF PHARMACY

(SPONSORED BY SRI KOUNDINYA EDUCATIONAL SOCIETY)

(Affiliated to Andhra University, Approved by AICTE & PCI)

NH-16, Chaitanya Knowledge City, RAJAHMUNDRY – 533 294, E.G. District, (A.P.)

Tel : 0883 – 2484444, 6577444, Fax: 0883 – 2484444, 2484739.

NAAC ACCREDITED

Faculty work Load for Academic Year 2021-2022

Sl. No	Name of the Faculty	B. Pharmacy			Pharm. D			M. Pharm			Total Work load (Hrs)
		Subjects taught	Th	Pr	Subjects taught	Th	Pr	Subjects taught	Th	Pr	
1	Dr.M.D. DhanaRaju							Advanced Biopharmaceutics and Pharmacokinetics	4	-	04
2	Dr.S. Ramachandran	Pharmacology-III	4	-				Advanced Pharmacology	4	-	08
3	Dr.R. Vijayalakshmi	Advanced Instrumentation Techniques	4	-				Modern Pharmaceutical Analytical Tecniques	4	-	08
4	Dr.V.D. Sundar	Pharmaceutics	4	-				Advanced Physical Pharmaceutics	4	-	08
5	Dr.AR.Magesh	Quality Assurance	4	-				Quality Management System	4	-	08
6	Mr.R. Balaji Rajan	Pharmaceutics	9	-				Regulatory Affairs	4	-	13
7	Dr.C. Gopi	Pharmaceutical Organic Chemistry-II	4	9							13
8	Dr.T. Deepan	Pharmaceutical Analysis	4	9				Pharmaceutical Validation	4	-	17
9	Mrs.R. SugunaDevi				Pharmaceutical Formulations	4	3	Modern Pharmaceutics	4	-	11
10	Dr.V. Alekhya	Herbal Drug Technology	4	9							13
11	Mr.M.Srirama Murthy				Pharmaceutical Analysis	4	3	Product Development and Technology Transfer	4	-	15
								Pharmaceutical Quality Assurance-II	-	4	
12	Mrs.V. Harsha Naveena				Medicinal Chemistry	4	3	Pharmaceutical Quality Assurance-I	-	4	11

13	Dr.K.V. Bhargavi	Social and Preventive Pharmacy	4	-	Pharmacoepidemiology and Pharmcoeconomics	4	-				**14**
					Clership	-	6				
14	Mrs.D. Kavitha				Medicinal Biochemistry	4	3				**07**
15	Mrs. Ch. Satyasri	Medicinal Chemistry-III	4	9							**13**
16	Mrs. K. Sarishma	Pharmacology-III	-	9							**09**
17	Mrs. B. Venkata Lakshmi	Physical Pharmacy	-	9	Pharmaceutical Microbiology	4	3				**16**
18	Mrs.Ch. Nandhini				Pharmaceutical Organic Chemistry	4	3				**07**
19	Mr.K. Shivaram	Pharmacology-III	-	9	Remedial Biology	4	3				**16**
20	Mrs.B. Kavya Chowdary				Clinical PKDM	4	-				**10**
					Clerkship	-	6				
21	Dr.P. Himasree				Pharmacotherapeutics-I	4	3				**13**
					Clerkship	-	6				
22	Mr.P. Mallesh	Pharmaceutical Engineering	4	9							**13**
23	Mrs.K. Karuna Kumari	Pharmaceutics	-	9				BPPK	-	4	**13**
24	Mrs.M. Varshini	Pharmaceutical Engineering	-	9							**9**
25	Mr. N.V. Koteswara Rao	Remedial Mathematics	4	-	Remedial Mathematics	4	-				**08**
26	Dr.D. Veerendra Kumar	Pharmacovigilance	4		Clerkship	-	6				**10**
27	Mr.K. Venkata Ravi Kiran	Pharmaceutical Biotecchnology	4	-							**04**

28	Mr.K. Lakshmana Praveen				BPPK	4	3	Advanced Physical Pharmaceutics	-	4	**11**
29	Mrs. Y. Naga Sri Ramya	Pharmaceutical Analysis	-	9							**09**
30	Mrs.T. Manasa				Pharmacology-II	4	3				**07**
31	Dr.G. Arunamayi	Biostatistics and Research Methodology	4	-	Biostatistics and Research Methodology	4	-				**08**
32	Mr.V. Anil Kumar				Pharmaceutics	4	3	BPPK	4	-	**11**
33	Mrs.N. Swapnika				Pharmaceutical Jurisprudence	4	-				**07**
					Pharmacology	-	3				
34	Ms.R. Harika				Human Anatomy and Physiology	4	3				**11**
					Pharmacology-I	4	-				
35	Dr.B. Lakshmi Himaja				Pathophysiology	4	-				**17**
					Clinical Pharmacy	4	3				
					Clerkship	-	6				
36	Mr.N.V.N. Koteswara Rao	Pharmaceutical Inorganic Chemistry	4	9							**13**
37	Mr.M. Madhubabu				Clinical Toxicology	4	-	Molecular Pharmacology	4	-	**12**
								Advanced Pharmacology	-	4	
38	Ms.A. Lakshmi Poojitha	Remedial Biology	4	3	Pharmacognosy & Phytochemistry	4	3				**13**
39	Ms.B. Jagadeshwari	Physical Pharmacy-I	4	9							**13**
40	Mr.R. Baladinakar	Computer Applications	4	9							**13**

41	Ms.G. Sai Kumari	Pharmaceutical Microbiology	4	9							**13**
42	Mrs. K. Pranusha	Pharmaceutical Inorganic Chemistry	-	9	Pharmaceutical Inorganic Chemistry	4	3				**16**
43	Mr.P. Srinu	Human Anatomy and Physiology	4	9				Drug Discovery	4	-	**17**
44	Dr.S. Ramam				Pharmacotheraepeutics -III	4	3				**17**
					Clinical Research	4	-				
					Clerkship	6	-				
45	Ms.K.L.S.D. Sireesha	Human Anatomy and Physiology	-	9	Community Pharmacy	4	-				**13**
46	Ms.K. Udhaya Bhanu				Pharmacotherapeutics-II	4	3				**13**
					Clerkship	-	6				
47	Mrs.P. Akhila Sushma devi				Hospital Pharmacy	4	3				**13**
					Clerkship	-	6				
48	Dr.Sireesha Sangamithra	Communication Skills	4	9							**13**

PRINCIPAL

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296, (A.P.)

GIET SCHOOL OF PHARMACY

NH-16, Chaitanya Knowledge City, Rajahmundry – 533 296

NAAC ACCREDITED

TIME TABLE FOR II/VI PHARM. D : ACADEMIC YEAR 2021– 2022

Day	9:30 – 10:30	10:30 – 11:30	11:30 – 12:30	LUNCH BREAK	1:15 – 2:15	2:15 – 3:15	3:15 – 4:15
	1	2	3		4	5	6
MON	Pharmacotherapeutics-I	Pharmacognosy	Pharmacology-I		Pharmacotherapeutics-I	Library	Pharmaceutical Microbiology
TUE	Pharmaceutical Microbiology Practical				Pharmaceutical Microbiology	Pharmacotherapeutics-I	Community Pharmacy
WED	Pharmacotherapeutics Practical				Pathophysiology	Pharmacology-I	Pharmacognosy
THU	Pharmacognosy Practical				Community Pharmacy	Pathophysiology	Pharmacotherapeutics-I
FRI	Pathophysiology	Library	Pharmaceutical Microbiology		Community Pharmacy	Pharmacology-I	Pharmacognosy
SAT	Pathophysiology	Pharmaceutical Microbiology	Community Pharmacy		Pharmacology-I	Study Hour	Pharmacognosy

W.E.F.: 08.11.2021

2.1	Pathophysiology	-	Dr. K. V. Bhargavi
2.2	Pharmaceutical Microbiology	-	Ms. Sai Kumari
2.3	Pharmacognosy & Phytopharmaceutical	-	Ms. A. Lakshmi Poojitha
2.4	Pharmacology-I	-	Mr. M. Madhu Babu (Class Teacher)
2.5	Community Pharmacy	-	Dr. D. Veerendra Kumar
2.6	Pharmacotherapeutics - I	-	Dr. B. Himaja

A. Lakshmi Poojitha

Programme coordinator

Course coordinator

GIET SCHOOL OF PHARMACY RAJAHMUNDRY 533 294 (A.P.)

PRINCIPAL

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City,
RAJAHMUNDRY-533 296.

GIET SCHOOL OF PHARMACY

NH-16, Chaitanya Knowledge City, Rajahmundry – 533 296

NAAC ACCREDITED

TIME TABLE FOR II/IV B.PHARMACY I Semester– Section A: ACADEMIC YEAR 2021-2022.

Day	9:30 – 10:30	10:30 – 11:30	11:30 – 12:30	LUNCH BREAK	1:15 – 2:15	2:15 – 3:15	3:15 – 4:15
	1	2	3		5	6	7
Mon	Pharmaceutical Microbiology – A Batch Pharmaceutical Organic Chemistry – B Batch Pharmaceutical Engineering – C Batch				Pharmaceutical Microbiology	Pharmaceutical Engineering	Physical Pharmaceutics
Tue	Physical Pharmaceutics – A Batch Pharmaceutical Engineering – B Batch Pharmaceutical Organic Chemistry – C Batch				Pharmaceutical Microbiology	Library	Pharmaceutical Engineering
Wed	Pharmaceutical Organic Chemistry – A Batch Physical Pharmaceutics – B Batch Pharmaceutical Microbiology – C Batch				Physical Pharmaceutics	Pharmaceutical Organic Chemistry	Pharmaceutical Microbiology
Thu	Pharmaceutical Engineering – A Batch Pharmaceutical Microbiology – B Batch Physical Pharmaceutics – C Batch				Pharmaceutical Microbiology	Pharmaceutical Organic Chemistry	Pharmaceutical Microbiology
Fri	Pharmaceutical Engineering	Library	Physical Pharmaceutics		Pharmaceutical Organic Chemistry	Pharmaceutical Engineering	Physical Pharmaceutics
Sat	Pharmaceutical Organic Chemistry	Pharmaceutical Engineering	Physical Pharmaceutics		Pharmaceutical Organic Chemistry	Life skills	

W.E.F: 21.04.2022

BP301T & 305P	-	Pharmaceutical Organic Chemistry II	-	Dr. C. Gopi (CI)
BP302T & 306P	-	Physical Pharmaceutics	-	Ms. B. Jagadeeswari
BP303T & 307P	-	Pharmaceutical Microbiology	-	Ms. G. sai kumari
BP304T & 308P	-	Pharmaceutical Engineering	-	Mr. P. Mallesh (Assisting Mrs. M. Varshini)

Programme coordinator **Course coordinator** **PRINCIPAL**

Dr. M.D. DHANA RAJU, M.Pharm., Ph.D.
Principal.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City

GIET SCHOOL OF PHARMACY

NH-16, Chaitanya Knowledge City, Rajahmundry – 533 296

NAAC ACCREDITED

TIME TABLE FOR II/IV B.PHARMACY I Semester– Section B: ACADEMIC YEAR 2021-2022.

Day	9:30 – 10:30	10:30 – 11:30	11:30 – 12:30	LUNCH BREAK	1:15 – 2:15	2:15 – 3:15	3:15 – 4:15
	1	2	3		5	6	7
Mon	Pharmaceutical Microbiology – A Batch Pharmaceutical Organic Chemistry – B Batch Pharmaceutical Engineering – C Batch				Physical Pharmaceutics	Pharmaceutical Organic Chemistry	Pharmaceutical Microbiology
Tue	Physical Pharmaceutics – A Batch Pharmaceutical Engineering – B Batch Pharmaceutical Organic Chemistry – C Batch				Pharmaceutical Engineering	Pharmaceutical Organic Chemistry	Pharmaceutical Microbiology
Wed	Pharmaceutical Organic Chemistry – A Batch Physical Pharmaceutics – B Batch Pharmaceutical Microbiology – C Batch				Pharmaceutical Microbiology	Pharmaceutical Engineering	Physical Pharmaceutics
Thu	Pharmaceutical Engineering – A Batch Pharmaceutical Microbiology – B Batch Physical Pharmaceutics – C Batch				Pharmaceutical Microbiology	Library	Pharmaceutical Organic Chemistry
Fri	Physical Pharmaceutics	Library	Pharmaceutical Engineering		Seminar on selected topic		Pharmaceutical Organic Chemistry
Sat	Physical Pharmaceutics	Library	Pharmaceutical Engineering		Life skills	Group discussion	

W.E.F: 23.02.2022

BP301T & 305P	-	Pharmaceutical Organic Chemistry	-	Ms. Ch.Nandhini (Class Incharge)
BP302T & 306P	-	Physical Pharmaceutics	-	Ms. B. Venkata lakshmi
BP303T & 307P	-	Pharmaceutical Microbiology	-	Dr. K. Manohar
BP304T & 308P	-	Pharmaceutical Engineering	-	Mrs. Karuna Kumari

Programme coordinator **Course coordinator** **PRINCIPAL**

Dr. M.H. [illegible]
Principal.
M.Pharm., Ph.
GIET SCHOOL OF PHARMACY
NH-16, Chaitanya Knowledge Ci
RAJAHMUNDRY 533 296; (

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII (5) Pharm - D/Time-Table/2021.

Visakhapatnam,
Date: 26-08-2021

From:
THE REGISTRAR

To
The Principal,
A.U.College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam – 530 003.

Sir,

Sub: - A.U. Examinations of III/VI Pharm. D Year-end Theory Regular & Supplementary Examinations scheduled to be held in September 2021, Time – Table, Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the III/VI Pharm. D Year-end Theory Regular and Supplementary Examinations Time-Table has been approved for conduct of Examinations scheduled to be held in September 2021.

Examinations Time-Table.

III/VI Pharm. D(from 2008 regulations) Year-end Theory Regular & Supplementary Examinations scheduled to be held in September 2021.

Timing: 2:00 P.M. to 5:00 P.M.

Date	Day	Name of the Subject	Max. Marks
01-09-2021	Wednesday	Pharmacology-II	70
02-09-2021	Thursday	Pharmaceutical Analysis	70
03-09-2021	Friday	Pharmacotherapeutics-II	70
04-09-2021	Saturday	Pharmaceutical Jurisprudence	70
06-09-2021	Monday	Medicinal Chemistry	70
07-09-2021	Tuesday	Pharmaceutical Formulations	70

(BY ORDER)

Yours faithfully,

(S.V.SUDHAKARA REDDY)
CONTROLLER OF EXAMINATIONS

Copies to:
The Principals of Pharm-D Colleges Affiliated to Andhra University, Visakhapatnam.
The All Officers of Examinations Branch, Andhra University, Visakhapatnam.
The Secretary to Vice-Chancellor and P.A. to Registrar, Andhra University, Visakhapatnam.
The Dean, Confidential Section, Andhra University, Visakhapatnam.
The Hon'Director, Computer Centre, A.U., with a request to keep the time-table to A.U.Website.
The Superintendents, E IX, E X, A II & A VI Section, Andhra University, Visakhapatnam.
O.O.F

GIET SCHOOL OF PHARMACY RAJAHMUNDRY (A.P.)

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296. (A.P.)

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII (5) Pharm - D/ Time-Table/2021.

Visakhapatnam,
Date:02-08-2021.

THE REGISTRAR,

To
The Principal,
A. U.College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam – 530 003.

Sir,

Sub: - A.U. Examinations Schedule of II/VI and IV/VI Pharm. D (2008 Regulations) Theory Regular & Supplementary Examinations scheduled to be held in August 2021, Time – Table, Approval – Reg.

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With reference to the letter cited above, I am by direction to inform you that the following are the II/VI and IV/VI Pharm. D (2008 Regulations) Theory Regular and Supplementary Examinations Time-Table has been approved for conduct of Examinations scheduled to be held in August 2021.

Examinations Time-Table: II/VI and IV/VI Pharm. D (2008 Regulations) Theory Regular & Supplementary Examinations scheduled to be held in August 2021.

Timing: 09:30 A.M. to 12:30 P.M. and 2.00 P.M to 5.00 P.M

Date	Name of the course		Max.Marks
	II/VI Pharm-D	IV/VI Pharm-D	
	9.30am-12.30pm	2.00pm-5.00pm	
23-08-2021 Monday	2.1 Pathophysiology	4.1 Pharmacotherapeutics-III	70
24-08-2021 Tuesday	2.2 Pharmaceutical Microbiology	4.2 Hospital Pharmacy	70
25-08-2021 Wednesday	2.3 Pharmacognosy & Phytopharmaceuticals	4.3 Clinical Pharmacy	70
26-08-2021 Thursday	2.4 Pharmacology-I	4.4 Biostatistics & Research Methodology	70
27-08-2021 Friday	2.5 Community Pharmacy	4.5 Biopharmaceutics & Pharmacokinetics	70
28-08-2021 Saturday	2.6 Pharmacotherapeutics-I	4.6 Clinical Toxicology	70
31-08-2021 Tuesday	----	**4.7 Pharmacotherapeutics-I & II***	70

Additional Subject for IV/VI Pharm-D (PB) All other subjects are same for both Pharm-D and Pharm-D (PB) Programme.

(BY ORDER)

Yours faithfully,

(S.V.SUDHAKARA REDDY)
CONTROLLER OF EXAMINATIONS

Copies to:
The Principals of B. Pharmacy Colleges Affiliated to Andhra University, Visakhapatnam.
The All Officers of Examinations Branch, Andhra University, Visakhapatnam.
The Secretary to Vice-Chancellor and P.A. to Registrar, Andhra University, Visakhapatnam.
The Dean, Confidential Section, Andhra University, Visakhapatnam.
The Hon' Director, Computer Centre, A.U., with a request to keep the time-table to A.U. Website.
The Superintendents, E IX, E X, A II & A VI Section, Andhra University, Visakhapatnam.
O.O.F

Dr. M.D. PRASADA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City,
RAJAHMUNDRY-533 296.

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII(5)/B. Pharmacy/ Time-Table/2021

Visakhapatnam,
Date: 07-09-2021

To
The Principal
A.U. College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam

Sir,

Sub:- A.U. Examination schedule for I/IV, I Semester and I/IV Year End B. Pharmacy Theory (Regular & Supplementary, 2013-14 and 2017-18 Admitted Batch) Examinations September, 2021, Time-Table Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy I/IV, I Semester and I/IV Year End examinations schedule to be held in the month of September, 2021.

I/IV, B. Pharmacy I Semester theory **Regular and Supplementary** examination Time-Table September, 2021. (W.E.F 2017-18 Admitted Batch)

Timings: 09:30 A.M. to 12:30 PM

Date/Day	Name of the subject	Max. Marks
27-09-2021 Monday	Human Anatomy and Physiology-I	75
28-09-2021 Tuesday	Pharmaceutical Analysis-I	75
29-09-2021 Wednesday	Pharmaceutics-I	75
30-09-2021 Thursday	Pharmaceutical Inorganic Chemistry	75

Dr. M.D. DHANA RAJU,
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GIET SCHOOL OF PHARMACY,
NH 16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296.

I/IV Year End theory **Supplementary** examination Time-Table September 2021 (W.E.F 2013-14 Admitted Batch)

Timings: 09:30 A.M. to 12:30 PM

Date/Day	Name of the subject	Max. Marks
27-09-2021 Monday	Mathematics Biology	80
28-09-2021 Tuesday	English	80
29-09-2021 Wednesday	Pharmaceutical Chemistry-I (Inorganic)	80
30-09-2021 Thursday	Pharmaceutical Chemistry-II (Organic-I)	80
01-10-2021 Friday	Computer Applications	80
04-10-2021 Monday	General & Dispensing Pharmacy	80
05-10-2021 Tuesday	Physical Pharmacy-I	80
06-10-2021 Wednesday	Human Physiology –I (Health Education & Pathophysiology)	80
07-10-2021 Thursday	Environmental Sciences	80

(By order)

Yours faithfully,

(J. RATNAM)

ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:

The Principals of B. Pharmacy Colleges Affiliated to Andhra University,
The All Officers of Examinations Branch, A.U., VSP
The Secretary to Vice-Chancellor table and P.A. to Registrar, A.U.
The Dean (Confidential Section)A.U., VSP
The Hon' Director, Computer Centre, A.U., with a request to keep the time-table to A.U. Website
The Superintendent's E IX Section and E X Section, A II Sec. and A VI Section, A.U., VSP
O.O.F.

GIET SCHOOL OF PHARMACY RAJAHMUNDRY (A.P.)

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH 16, Chaitanya Knowledge City
RAJAHMUNDRY 533 296, (A.P.)

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII(5)/B. Pharmacy/ Time-Table/2021

Visakhapatnam,
Date: 20-12-2021

To
The Principal
A.U.College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam

Sir,

Sub:- A.U. Examination schedule for III/IV, Ist Semester B. Pharmacy Theory (Regular & Supplementary, 2013-14 and 2017-18 Admitted Batch) Examinations January, 2022, Time-Table Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the end - theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy III/IV, Ist Semester examinations schedule to be held in the month of January, 2022.

III/IV, B. Pharmacy Ist Semester end theory Regular examination Time-Table January,2022, (W.E.F 2017-18 Admitted Batch)

Timings: 09:30 A.M. to 12:30 PM

Date	Day	Name of the Subject	Max. Marks
20-01-2022	Thursday	Medicinal Chemistry-II	75
21-01-2022	Friday	Industrial Pharmacy-I	75
22-01-2022	Saturday	Pharmacology-II	75
24-01-2022	Monday	Pharmacognosy and Phytochemistry-II	75
25-01-2022	Tuesday	Pharmaceutical Jurisprudence	75

III/IV, B. Pharmacy Ist Semester end theory Supplementary examination Time-Table January 2022 (W.E.F 2013-14 Admitted Batch)

Timings : 09:30 A.M. to 12:30 PM

Date	Day	Name of the Subject	Max. Marks
20-01-2022	Thursday	Pharmaceutical Biotechnology	80
21-01-2022	Friday	Medicinal Chemistry-I	80
22-01-2022	Saturday	Pharmaceutical Engineering-II	80
24-01-2022	Monday	Hospital and Community Pharmacy and Industrial Management	80

(By order)

Yours faithfully,

(J RATNAM)
ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:
The Principals of B.Pharmacy Colleges Affiliated to Andhra University,
The All Officers of Examinations Branch, A.U., VSP
The Secretary to Vice-Chancellor table and P.A. to Registrar, A.U.
The Dean (Confidential Section)A.U., VSP
The Hon'Director, Computer Centre, A.U., with a request to keep the time-table to A.U

Dr. M.D. DHANA RAJU, M.Pharm., Ph.D
Principal
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296, (A.P.)

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII(5)/B. Pharmacy/ Time-Table/2021

Visakhapatnam,
Date: 20-12-2021

To
The Principal
A.U.College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam

Sir,

Sub:- A.U. Examination schedule for IV/IV, Ist Semester B. Pharmacy Theory (Regular & Supplementary, 2013-14 and 2017-18 Admitted Batch) Examinations January 2022 Time-Table Approval - Reg

***

With reference to the letter cited above, I am by direction to inform you that the following are the end - theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy IV/IV, Ist Semester examinations schedule to be held in the month of January, 2022.

IV/IV, B. Pharmacy Ist Semester end theory **Regular** examination Time-Table January 2022 (W.E.F 2017-18 Admitted Batch)
Timings: 09:30 A.M. to 12:30 P.M

Date	Day	Name of the Subject	Max. Marks
03-01-2022	Monday	Instrumental Methods of Analysis	75
04-01-2022	Tuesday	Industrial Pharmacy II	75
05-01-2022	Wednesday	Pharmacy Practice	75
06-01-2022	Thursday	Novel Drug Delivery System	75

IV/IV, B. Pharmacy Ist Semester end theory Supplementary examination Time-Table January 2022 (W.E.F 2013-14 Admitted Batch)
Timings : 09:30 A.M. to 12:30 P.M

Date	Day	Name of the Subject	Max. Marks
03-01-2022	Monday	Pharmaceutical Chemistry (Natural Products)	80
04-01-2022	Tuesday	Pharmacology-II	80
05-01-2022	Wednesday	Pharmacognosy and Phytochemistry-II	80
06-01-2022	Thursday	GMP and Validation	80

(By order)

Yours faithfully,

(J.RATNAM)
ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:
The Principals of B. Pharmacy Colleges Affiliated to Andhra University,
The All Officers of Examinations Branch, A.U., VSP
The Secretary to Vice-Chancellor table and P.A. to Registrar, A.U.
The Dean (Confidential Section) A.U., VSP
The Hon' Director, Computer Centre, A.U., with a request to keep the time-table to A.U.

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296.

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII(5)/B. Pharmacy/ Time-Table/2021
Visakhapatnam,

Date: 17-01-2022.

To
The Principal
A.U.College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam

Sir,

Sub:- A.U. Examination schedule for I/IV IInd, and I/IV Year End Semester B. Pharmacy Theory (Regular & Supplementary, 2013-14 and 2017-18 Admitted Batch) Examinations February 2022, Time-Table Approval - Reg

***

With reference to the letter cited above, I am by direction to inform you that the following are the end - theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy I/IV IInd and I/IV Year End Semester examinations schedule to be held in the month of February, 2022.

I/IV, B. Pharmacy IIND Semester end theory **Regular** examination Time-Table February, 2022 (W.E.F 2017-18 Admitted Batch)

Timings: 09:30 A.M. to 12:30 P.M

Date	Day	Name of the Subject	Max. Marks
07-02-2022	Monday	Human Anatomy and Physiology II	75
08-02-2022	Tuesday	Pharmaceutical Organic Chemistry-I	75
09-02-2022	Wednesday	Biochemistry	75
10-02-2022	Thursday	Pathophysiology	75
11-02-2022	Friday	Computer Applications in Pharmacy*	50
14-02-2022	Monday	Environmental Sciences*	50

*Non-University Exams

GIET SCHOOL OF PHARMACY RAJAHMUNDRY (A.P.)

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.
GIET SCHOOL OF PHARMACY,
NH 16, Chaitanya Knowledge City
RAJAHMUNDRY

I/IV Year End Semester theory B. Pharmacy Supplementary examination Time-Table February 2022 (W.E.F 2013-14 Admitted Batch)

Timings : 09:30 A.M. to 12:30 P.M

Date	Day	Name of the Subject	Max. Marks
07-02-2022	Monday	1. Mathematics 2. Biology	80
08-02-2022	Tuesday	English	80
09-02-2022	Wednesday	Soft Skills	80
10-02-2022	Thursday	Pharmaceutical -1 (Inorganic)	80
11-02-2022	Friday	Pharmaceutical – II (Organic-I)	80
14-02-2022	Monday	Computer Application	80
15-02-2022	Tuesday	General Dispensing Pharmacy	80
16-02-2022	Wednesday	Physical Pharmacy – I	80
17-02-2022	Thursday	Human Physiology	80
18-02-2022	Friday	Environmental Sciences	80

(By order)

Yours faithfully,

(J.RATNAM)

ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:

The Principals of B. Pharmacy Colleges Affiliated to Andhra University,
The All Officers of Examinations Branch, A.U., VSP
The Secretary to Vice-Chancellor table and P.A. to Registrar, A.U.
The Dean (Confidential Section) A.U., VSP
The Hon' Director, Computer Centre, A.U., with a request to keep the time-table A.U.

GIET SCHOOL OF PHARMACY RAJAHMUNDRY (A.P.)

Dr. M.D. DHANA RAJU, M.Pharm., Ph.D
Principal.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296. (A.P.)

III/IV B. Pharmacy II Semester – End Supplementary Theory Examinations to be held in May - 2022 (W.E. F. 2013 – 2014 Regulations).

Timing: 09:30 A.M. to 12:30 P.M.

Date/ Day	Course No.	Name of the Subject	Max.Marks
09-05-2022 Monday	601	Pharmacology – I	80
10-05-2022 Tuesday	603	Medicinal Chemistry – II	80
11-05-2022 Wednesday	605	Industrial Pharmacy & Cosmetic Technology	80
12-05-2022 Thursday	607	Pharmaceutical Jurisprudence	80

(By order)

Yours faithfully,

(J. RATNAM)
ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:

The Principals of B. Pharmacy Colleges Affiliated to Andhra University,
The All Officers of Examinations Branch, A.U., VSP
The Secretary to Vice-Chancellor table and P.A. to Registrar, A.U.
The Dean (Confidential Section)A.U., VSP
The Hon'Director, Computer Centre, A.U., with a request to keep the time-table to A.U. Website
The Superintendent's E IX Section and E X Section, A II Sec. and A VI

GIET SCHOOL OF PHARMACY RAJAHMUNDRY (A.P.)

Dr. M.D. DHANA RAJU, M.Pharm., Ph.D
Principal.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY 533 296, (A.P.)

IV/IV, B. Pharmacy II Semester - (W.E. F. 2013-2014 Regulations) Supplementary theory examination Time-Table April, 2022.

Timings: 9:30 A.M. to 12:30 PM

Date Day	Course No.	Name of the Subject	Max.Marks
18-04-2022 Monday	801	Pharmaceutical Analysis-II	80
19-04-2022 Tuesday	803	Biopharmaceutics & Pharmacokinetics	80
20-04-2022 Wednesday	805	Clinical Pharmacy & Therapeutics	80
21-04-2022 Thursday	806	Novel Drug Delivery Systems	80

(By order)

Yours faithfully,

(J. RATNAM)
ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:

The Principals of B. Pharmacy Colleges Affiliated to Andhra University,
The All Officers of Examinations Branch, A.U., VSP
The Secretary to Vice-Chancellor table and P.A. to Registrar, A.U.
The Dean (Confidential Section)A.U., VSP
The Hon'Director, Computer Centre, A.U., with a request to keep the time-table to A.U. Website
The Superintendent's E IX Section and E X Section, A II Sec. and A VI

GIET SCHOOL OF PHARMACY RAJAHMUNDRY 533 294 (A.P.)

Dr. M.D. DHANA RAJU, M.Pharm., Ph.D
Principal.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296: (AP)

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII(5)/B. Pharmacy/ Time-Table/2022

Visakhapatnam,
Date: 29-03-2022

To
The Principal
A.U. College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam.

Sir,

Sub:- A.U. Examination schedule for IV/IV, B. Pharmacy II Semester (2017 – 2018 and 2013-2014 Regulations) Regular and Supplementary Theory examination Time Table April – 2022, Time-Table Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the end - theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy IV/IV, II Semester examinations schedule to be held in the month of April, 2022.

IV/IV, B. Pharmacy II Semester (2017 – 2018 Regulations) end regular theory examination Time-Table April – 2022.

Timings: 9:30 A.M. to 12:30 PM & 02.00.P.M to 05.00.PM

Date Day	Course No.	Name of the Subject Timings: 9:30 A.M. to 12:30 PM	Course No	Name of the Subject Timings: 02.00.P.M to 05.00.PM
18-04-2022 Monday	BP 801 T	Biostatistics and Research Methodology	-----	------
19-04-2022 Tuesday	BP 802 T	Social and Preventive Pharmacy	-----	------
20-04-2022 Wednesday	BP 803 ET	Pharmaceutical Marketing	BP 804 ET	Pharmaceutical Regulatory Science
21-04-2022 Thursday	BP 805 ET	Pharmacovigilance	BP 806 ET	Quality Control and Standardization of herbals
22-04-2022 Friday	BP 807 ET	Computer Aided Drug Design	BP 808 ET	Cell and Molecular Biology
23-04-2022 Saturday	BP 809 ET	Cosmetic Science	BP 810 ET	Experimental Pharmacology
25-04-2022 Monday	BP 811 ET	Advanced Instrumentation Techniques	BP 813 ET	Dietary Supplements and Nutraceuticals
26-04-2022 Tuesday	BP 812 ET	Pharmaceutical Product Development	-------	------
27-04-2022 To 29-04-2022	PW BP 814	Project Work	--------	-------

SCHOOL OF PHARMACY GIET RAJAHMUNDRY Estd 2004 (A.P.)

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296. (A.P.)

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII(5)/B. Pharmacy/ Time-Table/2022

Visakhapatnam,
Date: 29-03-2022

To
The Principal
A.U. College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam.

Sir,

Sub:- A.U. Examination schedule for III/IV, B. Pharmacy II Semester (2017 – 2018 and 2013-2014 Regulations) Regular and Supplementary Theory examination Time Table May – 2022, Time-Table Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the end - theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy III/IV, II Semester examinations schedule to be held in the month of May, 2022.

III/IV B. Pharmacy II Semester - End Regular & Supplementary Theory Examinations to be held in May 2022 (W.E. F. 2017-2018 Regulations).

Timing: 09:30 A.M. to 12:30 P.M.

Date/ Day	Course No.	Name of the Subject	Max.Marks
09-05-2022 Monday	BP 601 T	Medicinal Chemistry – III	75
10-05-2022 Tuesday	BP 602 T	Pharmacology – III	75
11-05-2022 Wednesday	BP 603 T	Herbal Drug Technology	75
12-05-2022 Thursday	BP 604 T	Bio Pharmaceutics and Pharmacokinetics	75
13-05-2022 Friday	BP 605 T	Pharmaceutical Biotechnology	75
16-05-2022 Monday	BP 606 T	Quality Assurance	75

GIET SCHOOL OF PHARMACY
NH-16, RAJAHMUNDRY
Ph.No. 294 (A.P.)

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296. (A.P.)

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

F.VIII(5)/B. Pharmacy/ Time-Table/2022

Visakhapatnam,
Date: 17-05-2022

To
The Principal,
A.U. College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam.

Sir,

Sub:- A.U. Examination schedule for I/IV, I Semester and I/IV Year - End B. Pharmacy Theory (Regular & Supplementary, 2013-14 and 2017-18 Admitted Batch Examinations held in June, 2022, Time- Table Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the end - theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy I/IV, I Semester and I/IV Year End examinations schedule to be held in the month of June, 2022.

I/IV, B. Pharmacy I Semester theory **Regular** examination Time-Table June,2022. (W.E.F 2017-18 Admitted Batch)

Timings: 09:30 A.M. to 12:30 PM

Date	Day	Name of the Subject	Max. Marks
24-06-2022	Friday	Human Anatomy and Physiology-I	75
25-06-2022	Saturday	Pharmaceutical Analysis – I	75
27-06-2022	Monday	Pharmaceutics – I	75
28-06-2022	Tuesday	Pharmaceutical Inorganic Chemistry	75

1

GIET SCHOOL OF PHARMACY RAJAHMUNDRY (A.P.)

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH 16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296 (A.P.)

ANDHRA UNIVERSITY

M.PHARMACY EXAMIANTIONS
Time Tables

I/II M. Pharm. I Semester-end Theory Regular Examination July, 2022
(2020- 2021 Regulations)
Timings: 9.30 A.M. to 12.30 P.M.

Pharmaceutical Quality Assurance (MQA)

Date	Code No.	Subject	Max Marks
04-07-2022 Monday	50101	Modern Pharmaceutical Analytical Techniques	70
05-07-2022 Tuesday	58106	Quality Management System	70
06-07-2022 Wednesday	51107	Pharmaceutical Validation	70
07-07-2022 Thursday	58108	Product Development and Technology Transfer	70

I/II M. Pharm. I Semester-end Theory Supplementary Examination July, 2022
(2013-2014 Regulations)
Timings: 9.30 A.M. to 12.30 P.M.

Pharmaceutical Analysis & Quality

Date	Code No.	Subject	Max Marks
04-07-2022 Monday	51101	Biostatistics	80
05-07-2022 Tuesday	51102	Advanced Pharmaceutical Analysis -I	80
06-07-2022 Wednesday	58104	Quality Control of Pharmaceuticals	80

(By Order)

(M PADMA RAJU)
Deputy Registrar (Exams)

A.U.C.O.E
Date: 16-06-2022

GIET SCHOOL OF PHARMACY, RAJAHMUNDRY 533 294 (A.P.)

Dr. M.D. DHANA RAJU, M.Pharm., Ph.D
Principal.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296 (A.P.)

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII (5) Pharm - D/Time-Table/2022.

Visakhapatnam,
Date17-05-2022

From:
THE REGISTRAR

To
The Principal,
A.U.College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam – 530 003.

Sir,

Sub: - A.U. Examinations of V/VI Pharm. D Year-end Theory Regular & Supplementary Examinations scheduled to be held in June 2022 , Time – Table, Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the V/VI Pharm. D Year-end Theory Regular and Supplementary Examinations Time-Table has been approved for conduct of Examinations scheduled to be held in June 2022.

Examinations Time-Table.

V/VI Pharm. D Year-end Theory Regular & Supplementary Examinations scheduled to be held in June 2022 .

Timing: 09:30 A.M. to 12:30 P.M.

Date	Day	Name of the Subject	Max. Marks
06-06-2022	Monday	5.1 Clinical Research	70
07-06-2022	Tuesday	5.2 Pharmacoepidemiology and Pharmacoeconomics	70
08-06-2022	Wednesday	5.3 Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	70

(BY ORDER)

Yours faithfully,

(J. RATNAM)
ADDITIONAL CONTROLLER OF EXAMINATIONS

Copies to:

The Principals of Pharm-D Colleges Affiliated to Andhra University, Visakhapatnam.
The All Officers of Examinations Branch, Andhra University, Visakhapatnam.
.The Hon'Director, Computer Centre, A.U., with a request to keep the time-table to A.U.Website

GIET SCHOOL OF PHARMACY RAJAHMUNDRY 533 294 (A.P.)

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296. (AP

I/IV, Year End Semester B. Pharmacy theory **Supplementary** examinations Time-Table June, 2022 (W.E.F 2013-14 Admitted Batch)

Timings : 09:30 A.M. to 12:30 PM

Date	Day	Name of the subject	Max. Marks
24-06-2022	Friday	Mathematics Biology	80
25-06-2022	Saturday	English	80
27-06-2022	Monday	Pharmaceutical Chemistry – I (Inorganic)	80
28-06-2022	Tuesday	Pharmaceutical Chemistry – II (Organic)	80
29-06-2022	Wednesday	Computer Applications	80
30-06-2022	Thursday	General & Dispensing Pharmacy	80
01-07-2022	Friday	Physical Pharmacy – I	80
02-07-2022	Saturday	Human Physiology – I (Health Education & Pathophysiology)	80
04-07-2022	Monday	Environmental Sciences	80

(By order)

Yours faithfully,

(J.RATNAM)
ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:

The Principals of B. Pharmacy Colleges Affiliated to Andhra University,
The All Officers of Examinations Branch, A.U., VSP
The Secretary to Vice-Chancellor table and P.A. to Registrar, A.U.
The Dean (Confidential Section)A.U., VSP
The Hon'Director, Computer Centre, A.U., with a request to keep the time-table to A.U. Website
The Superintendent's E IX Section and E X Section, A II Sec. and A VI Section A.U., VSP
O.O.F.

1

GIET SCHOOL OF PHARMACY RAJAHMUNDRY (A.P.)

Dr. M.D. DHANA RAJU, M.Pharm., Ph.D
Principal.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296: (AP

II/IV, B. Pharmacy I Semester end theory **Supplementary** examination Time-Table June, 2022 (W.E.F 2013-14 Admitted Batch)

Timings : 09:30 A.M. to 12:30 PM

Date	Day	Name of the subject	Max. Marks
06-06-2022	Monday	Human Physiology & Health Education – II	80
07-06-2022	Tuesday	Pharmaceutical Analysis – I	80
08-06-2022	Wednesday	Physical Pharmacy – II	80
09-06-2022	Thursday	Pharmaceutical Chemistry – III (Organic - II	80

(By order)

Yours faithfully,

(J.RATNAM)
ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:

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The All Officers of Examinations Branch, A.U., VSP
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The Superintendent's E IX Section and E X Section, A II Sec. and A VI Section A.U., VSP
O.O.F.

GIET SCHOOL OF PHARMACY
NH-16, RAJAHMUNDRY
Pin 533 294 (A.P.)

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296: (AP

I/IV, Year End Semester B. Pharmacy theory **Supplementary** examinations Time-Table June, 2022 (W.E.F 2013-14 Admitted Batch)

Timings : 09:30 A.M. to 12:30 PM

Date	Day	Name of the subject	Max. Marks
24-06-2022	Friday	Mathematics Biology	80
25-06-2022	Saturday	English	80
27-06-2022	Monday	Pharmaceutical Chemistry – I (Inorganic)	80
28-06-2022	Tuesday	Pharmaceutical Chemistry – II (Organic)	80
29-06-2022	Wednesday	Computer Applications	80
30-06-2022	Thursday	General & Dispensing Pharmacy	80
01-07-2022	Friday	Physical Pharmacy – I	80
02-07-2022	Saturday	Human Physiology – I (Health Education & Pathophysiology)	80
04-07-2022	Monday	Environmental Sciences	80

(By order)

Yours faithfully,

(J.RATNAM)
ADDITIONAL CONROLLER OF EXAMINATIONS

Copies to:

The Principals of B. Pharmacy Colleges Affiliated to Andhra University,
The All Officers of Examinations Branch, A.U., VSP
The Secretary to Vice-Chancellor table and P.A. to Registrar, A.U.
The Dean (Confidential Section)A.U., VSP
The Hon'Director, Computer Centre, A.U., with a request to keep the time-table to A.U. Website
The Superintendent's E IX Section and E X Section, A II Sec. and A VI Section A.U., VSP
O.O.F.

GIET SCHOOL OF PHARMACY RAJAHMUNDRY A.P.

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.D
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
RAJAHMUNDRY-533 296: (A.P.)

ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII(5)/B. Pharmacy/ Time-Table/2022

Visakhapatnam,
Date: 17-05-2022

To
The Principal,
A.U. College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam.

Sir,

Sub:- A.U. Examination schedule for II/IV, I Semester B. Pharmacy Theory (Regular & Supplementary, 2013-14 and 2017-18 Admitted Batch Examinations held in June, 2022, Time-Table Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the end - theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy II/IV, I Semester examinations schedule to be held in the month of June, 2022.

, IV, B. Pharmacy I Semester end theory **Regular** examination Time-Table June, 2022 (W.E.F 2017-18 Admitted Batch)

Timings: 09:30 A.M. to 12:30 PM

Date	Day	Name of the Subject	Max. Marks
06-06-2022	Monday	Pharmaceutical Organic Chemistry II	75
07-06-2022	Tuesday	Physical Pharmaceutics – I	75
08-06-2022	Wednesday	Pharmaceutical Microbiology	75
09-06-2022	Thursday	Pharmaceutical Engineering	75

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ANDHRA UNIVERSITY

M.PHARMACY EXAMIANTIONS
Time Tables

I/II M. Pharm. I Semester-end Theory Regular Examination July, 2022
(for 2020-2021 Admitted Batch and Supplementary 2013-2014 Regulation)
Timings: 9.30 A.M. to 12.30 P.M.

Pharmaceutical Technology

Date	Code No.	Subject	Max Marks
04-07-2022 Monday	51101	Biostatistics	80
05-07-2022 Tuesday	53102	Biopharmaceutics & Pharmacokinetics	80
06-07-2022 Wednesday	53104	Advanced Physical Pharmaceutics	80

(By Order)

A.U.C.O.E
Date: 16-06-2022

(M PADMA RAJU)
Deputy Registrar (Exams)

GIET SCHOOL OF PHARMACY
NH-16, RAJAHMUNDRY
Pin-533 294 (A.P.)

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ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E.VIII(5)/B. Pharmacy/ Time-Table/2022

Visakhapatnam,
Date: 17-05-2022

To
The Principal,
A.U. College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam.

Sir,

Sub:- A.U. Examination schedule for I/IV, I Semester and I/IV Year - End B. Pharmacy Theory (Regular & Supplementary, 2013-14 and 2017-18 Admitted Batch Examinations held in June, 2022, Time- Table Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the end - theory (Regular & Supplementary Examinations) Time-Table has been approved for conduct of B. Pharmacy I/IV, I Semester and I/IV Year End examinations schedule to be held in the month of June, 2022.

I/IV, B. Pharmacy I Semester theory **Regular** examination Time-Table June,2022. (W.E.F 2017-18 Admitted Batch)

Timings: 09:30 A.M. to 12:30 PM

Date	Day	Name of the Subject	Max. Marks
24-06-2022	Friday	Human Anatomy and Physiology-I	75
25-06-2022	Saturday	Pharmaceutical Analysis – I	75
27-06-2022	Monday	Pharmaceutics – I	75
28-06-2022	Tuesday	Pharmaceutical Inorganic Chemistry	75

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ANDHRA UNIVERSITY
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

E-VIII (5) Pharm - D/ Time-Table/2022.

Visakhapatnam,
Date:17-05-2022.

THE REGISTRAR,

To
The Principal,
A. U. College of Pharmaceutical Sciences,
Andhra University,
Visakhapatnam – 530 003.

Sir,

Sub: - A.U. Examinations Schedule of IV/VI Pharm. D Theory Regular & Supplementary Examinations scheduled to be held in June 2022, Time – Table, Approval – Reg.

***

With reference to the letter cited above, I am by direction to inform you that the following are the IV/VI Pharm. D (2008 Regulations) Theory Regular and Supplementary Examinations Time-Table has been approved for conduct of Examinations scheduled to be held in June 2022.

Examinations Time-Table: IV/VI Pharm. D (2008 Regulations) Theory Regular & Supplementary Examinations scheduled to be held in June 2022.

Timing: 09:30 A.M. to 12:30 P.M

Date	Day	Name of the Subject	Max. Marks
22-06-2022	Wednesday	4.1 Pharmacotherapeutics-III	70
23-06-2022	Thursday	4.2 Hospital Pharmacy	70
24-06-2022	Friday	4.3 Clinical Pharmacy	70
25-06-2022	Saturday	4.4 Biostatistics & Research Methodology	70
27-06-2022	Monday	4.5 Biopharmaceutics & Pharmacokinetics	70
28-06-2022	Tuesday	4.6 Clinical Toxicology	70
29-06-2022	Wednesday	**4.7 Pharmacotherapeutics-I & II***	70

Additional Subject for IV/VI Pharm-D (PB) All other subjects are same for both Pharm-D and Pharm-D (PB) Programme.

(BY ORDER)

Yours faithfully,

(J. RATNAM)
ADDITIONAL CONTROLLER OF EXAMINATIONS

Copies to:
The Principals of B. Pharmacy Colleges Affiliated to Andhra University, Visakhapatnam.
The All Officers of Examinations Branch, Andhra University, Visakhapatnam.
The Secretary to Vice-Chancellor and P.A. to Registrar, Andhra University, Visakhapatnam.
The Dean, Confidential Section, Andhra University, Visakhapatnam.
The Hon' Director, Computer Centre, A.U., with a request to keep the time-table to
A.U. Website.

GIET SCHOOL OF PHARMACY, RAJAHMUNDRY (A.P.)

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ANDHRA UNIVERSITY

M.PHARMACY EXAMIANTIONS
Time Tables

I/II M. Pharm. I Semester-end Theory Regular Examination July, 2022
(2020- 2021 Regulations)
Timings: 9.30 A.M. to 12.30 P.M.

Pharmacology (MPL)

Date	Code No.	Subject	Max Marks
04-07-2022 Monday	50101	Modern Pharmaceutical Analytical Techniques	70
05-07-2022 Tuesday	55106	Advanced Pharmacology - I	70
06-07-2022 Wednesday	55107	Pharmacokinetics and Drug Metabolism	70
07-07-2022 Thursday	55108	Cellular and Molecular Pharmacology	70

I/II M. Pharm. I Semester-end Theory Supplementary Examination July, 2022
(2013-2014 Regulations)
Timings: 9.30 A.M. to 12.30 P.M.

Pharmacology

Date	Code No.	Subject	Max Marks
04-07-2022 Monday	51101	Biostatistics	80
05-07-2022 Tuesday	55102	Pharmacokinetics and Drug Metabolism	80
06-07-2022 Wednesday	55104	Systemic Pharmacology	80

(By Order)

A.U.C.O.E
Date: 16-06-2022

(M PADMA RAJU)
Deputy Registrar (Exams)

SCHOOL OF PHARMACY

ANDHRA UNIVERSITY

M.PHARMACY EXAMIANTIONS
Time Tables

I/II M. Pharm. I Semester-end Theory Regular Examination July, 2022
(2020- 2021 Regulations)
Timings: 9.30 A.M. to 12.30 P.M.

Pharmaceutics (MPH)

Date	Code No.	Subject	Max Marks
04-07-2022 Monday	50101	Modern Pharmaceutical Analytical Techniques	70
05-07-2022 Tuesday	53106	Advanced Biopharmaceutics & Pharmacokinetics	70
06-07-2022 Wednesday	53107	Modern Pharmaceutics	70
07-07-2022 Thursday	53108	Regulatory Affairs	70

I/II M. Pharm. I Semester-end Theory Supplementary Examination July, 2022
(2013-2014 Regulations)
Timings: 9.30 A.M. to 12.30 P.M.

Pharmaceutics

Date	Code No.	Subject	Max Marks
04-07-2022 Monday	51101	Biostatistics	80
05-07-2022 Tuesday	53102	Biopharmaceutics & Pharmacokinetics	80
06-07-2022 Wednesday	53104	Advanced Physical Pharmaceutics	80

(By Order)

A.U.C.O.E
Date: 16-06-2022

(M PADMA RAJU)
Deputy Registrar (Exams)

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GIET SCHOOL OF PHARMACY

(SPONSORED BY SRI KOUNDINYA EDUCATIONAL SOCIETY)

(Affiliated to Andhra University, Approved by AICTE & PCI)

NH-16, Chaitanya Knowledge City, RAJAHMUNDRY – 533 294, E.G. District, (A.P.)

Tel : 0883 – 2484444, 6577444, Fax: 0883 – 2484444, 2484739.

NAAC ACCREDITED

LESSION PLAN FOR II PHARM D (2021-2022)

PHARMACOGNOSY AND PHYTOPHARMACEUTICALS

S. no	Date	Unit	Topic to be Covered
1.	8/11/2021	1	Introduction to Pharmacognosy
2.	10/11/2021		Introduction to Pharmacognosy
3.	12/11/2021	2	Definition of pharmacognosy and its importance
4.	13/11/2021		History of pharmacology
5.	15/11/2021		History of pharmacology
6.	17/11/2021		Scope of pharmacology
7.	18/11/2021		Scope of pharmacology
8.	19/11/2021		Summary of Scope and History of pharmacology
9.	20/11/2021	3	Introduction to classification of crude drugs
10.	22/11/2021		Alphabetical classification of crude drugs
11.	24/11/2021		Chemotaxonomically classification of crude drugs
12.	26/11/2021		Morphological classification of crude drugs
13.	27/11/2021		Chemical classification of crude drugs
14.	29/11/2021		Therapeutical and Pharmacological classification of crude drugs
15.	01/12/2021		Summary of overall classification of crude drugs
16.	03/12/2021	4	Introduction to cultivation, processing, storage of crude drugs
17.	04/12/2021		Method of propagation
18.	06/12/2021		Vegetative or asexual propagation
19.	08/12/2021		Sexual propagation
20.	10/12/2021		Advantages and disadvantages of sexual and asexual propagation
21.	11/12/2021		Microbial propagation
22.	13/12/2021		Harvesting of crude drugs
23.	15/12/2021	5	General rules for collection of crude drugs
24.	16/12/2021		Drying of crude drugs
25.	20/12/2021		Storage of crude drugs

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26.	22/12/2021		Storage of crude drugs
27.	24/12/2021		Preservation of plant extract
28.	27/12/2021		Summary of cultivation, processing, storage of crude drugs
29.	29/12/2021		Introduction of cell wall constituents and cell inclusion
30.	31/12/2021		Various methods involved in cultivation of crude drugs
31.	03/01/2022		Introduction of cell wall constituents and cell inclusion
32.	05/01/2022	6	Cell wall constituents and its types
33.	07/01/2022		Function of cell wall constituents
34.	08/01/2022		Cell wall constituents and its types
35.	18/01/2022		Reserved food
36.	19/01/2022		Excretory and secretory products
37.	22/01/2022		Summary of cell wall constituents and cell inclusions
38.	24/01/2022		Intro. of microscopical, powder characteristics study of crude drugs.
39.	25/01/2022	7	Microscopical study of crude drugs
40.	29/01/2022		Powder characteristics of crude drugs
41.	31/01/2022		Summary of microscopical &Powder characteristics of crude drugs
42.	02/02/2022		Introduction of natural pesticides
43.	04/02/2022		Classification of pesticides
44.	05/02/2022		Mechanism of action of pesticides
45.	07/02/2022		Advantages & disadvantages of pesticides
46.	09/02/2022		Pyrethrum
47.	11/02/2022		Tobacco Leaf
48.	12/02/2022		Neem Leaf
49.	14/02/2022	8	Sabadilla seeds
50.	16/02/2022		Nux vomica seeds
51.	18/02/2022		Ryania root
52.	19/02/2022		Derris root
53.	21/02/2022		Summary of natural pesticides
54.	23/02/2022		Detailed study of various cell constituents.
55.	25/02/2022		Starch and cellulose
56.	26/02/2022		Alkaloids, mineral crystals
57.	28/02/2022	9	Glycosides and volatile oil
58.	02/03/2022		Summary of various cell constituents
59.	04/03/2022		Introduction to carbohydrate
60.	05/03/2022	10	Classification of carbohydrate containing crude drugs
61.	07/03/2022		Acacia
62.	09/03/2022		Agar

PHARMACY RAJAHMUNDRY 294 (A.P.)

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RAJAHMUNDRY-533 296.

63.	11/03/2022	11	Algin
64.	12/03/2022		Bael
65.	14/03/2022		Gaurgum
66.	16/03/2022		Pectin
67.	19/03/2022		Starch
68.	21/03/2022		Tragacanth
69.	23/03/2022		Honey
70.	25/03/2022		Isapgol
71.	26/03/2022		Sterculiagum
72.	28/03/2022		Test
73.	30/03/2022		Detailed study of carbohydrates and its products
74.	01/04/2022	12	Introduction to lipids
75.	04/04/2022		Definition, source of lipids
76.	06/04/2022		Method of extraction of lipids
77.	08/04/2022		Chemistry and method of analysis of lipids
78.	09/04/2022		Summary of lipids
79.	11/04/2022	13	Introduction to oils
80.	13/04/2022		Detailed study of various oils
81.	16/04/2022		Summary of overall oil products
82.	18/04/2022		Introduction to proteins
83.	20/04/2022		Properties of protein
84.	22/04/2022	14	Definition & classification of proteins
85.	23/04/2022		Simple conjugated & derived protein
86.	25/04/2022		Method of analysis of protein
87.	27/04/2022		Introduction of various protein crude drugs
88.	29/04/2022		Malt extract
89.	30/04/2022		Protamine sulphate
90.	02/05/2022		Heparin sodium
91.	04/05/2022		Absorbable & non-absorbable surgical sutures
92.	06/05/2022		Gelatine
93.	07/05/2022		Casein
94.	09/05/2022		Yeast
95.	11/05/2022		Cobra venom
96.	13/05/2022		Test
97.	14/05/2022		kavach
98.	16/05/2022		Test
99.	18/05/2022	15	Introduction to fibres
100.	19/05/2022		Source of fibres
101.	06/06/2022		Classification of fibres
102.	08/06/2022		Plant fibres
103.	10/06/2022		Jute
104.	13/06/2022		Flax
105.	15/06/2022		Cotton
106.	17/06/2022		Method of preparation of cotton
107.	18/06/2022		Animal fibres

GIET SCHOOL OF PHARMACY, RAJAHMUNDRY (A.P.)

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108.	20/06/2022		Silk
109.	22/06/2022		Wool
110.	24/06/2022		Synthetic & regenerated fibres
111.	25/06/2022		Minerals fibres-glass fibres, asbestos
112.	27/06/2022		Introduction to surgical dressing & bandages
113.	29/06/2022		Classification of surgical dressings
114.	01/07/2022		Introduction to sutures and classification
115.	02/07/2022	16	Introduction to adulteration crude drugs
116.	04/07/2022		Different methods of adulteration of crude drugs

PRINCIPAL

Dr. M.D. DHANA RAJU,
Principal. M.Pharm., Ph.
GIET SCHOOL OF PHARMACY,
NH-16, Chaitanya Knowledge City
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Pharmacognosy

INTRODUCTION :

Pharmacognosy may be defined as the branch of bioscience which treats in detail medicinal & related products of crude / primary type obtained from plant, animal & mineral origin.

- The study of crude drugs from natural sources treated scientifically & it encompasses preservation, study of sensory, physical, chemical & structural characters & uses of crude drugs
  - knowledge of history, distribution, cultivation, collection, processing for market.
- The study of other materials used in pharmacy such as suspending, disintegrating & flavouring agents, filtering aids & substances like antibiotics, allergens, hallucinogenic & poisonous plants,

immunizing agents, pesticides, raw materials for production of oral contraceptives etc.

Pharmacognosy is derived from "GREEK WORD"

pharmakon – a drug
Gignosco – to acquire the knowledge of

"SEYDLER" – A German Scientist coined the term "Pharmacognosy" in 1815 in the title of the work known as "ANALECTA PHARMACOGNOSTICA"

⇒ "FATHER OF PHARMACOGNOSY"

"Dioscorides" (Physician in Military)

⇒ "De Materia Medica"

→ Elaborating on large data about Medicinal plants.

⇒ "FATHER OF MEDICINE" ⇒ Hippocrates

HISTORY:

Medicinal properties (plants)

Rig Veda — Atharveda

AYURVEDA (An Ancient Science of life)

Treatises in Ayurveda.

Charaka Samhitha (Med. plants) ⇒ 50 groups of (10) herbs each

Sushrutha Samhitha (Surgery) (Med. prop) ⇒ 760 herbs in 7 distinct sets

Unit 1 K2

INTRODUCTION:

1.) Nature always stands as a golden mark exemplify the outstanding phenomenon of symbiosis
2.) The biotic & abiotic elements of nature are all independent.
3.) The plants are indispensable to man.

4.) The three imp necessities of life namely food, clothing, shelter & most of these are supplied by plant kingdom to the man.

5.) In china, many medicinal plants had been in use since 5000 B.C.

6.) Indians also, worked meticulously to examine & classify herbs which they came across, into the groups called "GUNAS".

7.) "CHARAKA" made 50 groups of (10) herbs each of which, according to him, would suffice an ordinary physicians need.

8.) "SUSHRUTHA" — 760 herbs in (7) distinct sets based on some of their common properties.

9.) A large portion of Indian population even today depends on INDIAN SYSTEM OF MEDICINE.

10.) AYURVEDA, An Ancient Science of life.

⇒ The treatises in AYURVEDA

- Charaka Samhitha (Med plants)
- Sushrutha Samhitha (Surgery) (Med. prep)

HISTORY:

11.) HIPPOCRATES (Father of Medicine) (460-360 B.C)

- Aristotle (384-322 BC)
- Dioscorides (40-90 AD) — father of pharmacognosy
- Galen (131-200 AD)

Early Arabian physicians, there was a period of approximately 1000 years the progress was made in the medical sciences.

I.) GALEN, the first pharmacist, was known to have had a no. of pain relieving materials, including OPIUM in his apothecary.

4.) The three imp necessities of life namely food, clothing, shelter & most of these are supplied by plant kingdom to the man.

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↓

Early Arabian physicians, there was a period of approximately 1000 years the progress was made in the medical sciences.

I.) GALEN, the first pharmacist, was known to have had a no. of pain relieving materials, including OPIUM in his apothecary.

12.) The french physician, DEROSNE isolated NARCOTINE from Opium in 1803.

13.) In 1806, SERTUERNER isolated Morphine from opium & its role in alleviating pain was recognised.

14.) Next few years,
- a.) Strychnine (1817)
- b.) Emetine (1817)
- c.) Brucine (1819)
- d.) Piperine (1819)
- e.) Quinine (1820)
- f.) Colchicine (1820) were isolated.

15.) The french pharmacist, PELLETEIR first reported isolation of Strychnine from ignatius beans later from nux-vomica.

16.) In 19th century, the term "MATERIA MEDICA" was used for the subject now known as "Pharmacognosy" while studying "Sarsaparilla"

DEFINITION OF PHARMACOGNOSY:

1.) Pharmacognosy may be defined as branch of bioscience which treats in detail Medicinal & related products of crude/primary type obtained from plant, animal / mineral origin.

SCOPE OF PHARMACOGNOSY:

2.) It is the study of crude drugs from natural sources treated scientifically & it encompasses KNOWLEDGE OF HISTORY, DISTRIBUTION, CULTIVATION, COLLECTION, PROCESSING FOR MARKET, allows Preservation, study of sensory, physical, chemical & structural characters & uses of crude drugs.

3.) It is the study of other materials used in the pharmacy such as

suspending, disintegrating & flavouring agents, filtering aids & substances like antibiotics, allergans hallucinogenic & poisonous plants, immunizing agents, pesticides, raw materials for production of oral Contraceptives etc..

4.) It is an applied science has played a crucial role in the development of different disciplines of science.

5.) The knowledge of plant taxonomy, plant breeding, plant pathology, plant Genetics is helpful in development of cultivation of technology for medicinal & aromatic plants.

6.) Pharmacognosist should posses a sound knowledge of terms describe the plant & Animal drugs those are covered in botany & zoology.

7.) The knowledge of chemotaxonomy, Biogenetic pathways for formation of medicinally active primary & secondary metabolites, plant tissue culture.

8.) Knowledge of biochemistry, chemical engineering is essential for development of processing & storage technology of crude drugs.

9.) It is an imp link between Pharmacology & Medicinal chemistry. Knowledge of pharmacology is essential for understanding action of drugs on animals & human being.

10.) Pharmacognosy is the infrastructure on which depends evolution of Novel medicines.

11.) Imp bridge between pharmaceutical & basic sciences.

12.) It is a vital link between

Ayurvedic & Allopathic systems of medicines.

13.) It provides a system wherein the active principles of crude drugs derived from natural origin & could be dispensed, formulated & manufactured in crude drugs derived from natural origin can be dispensed, formulated & Manufactured in dosage forms acceptable to the allopathic system of Medicine.

Unit-3 Classification of crude Drugs

- The term "CRUDE DRUG" is referred in relation to the natural product that has not been advanced in value or improved in condition by any process / treatment beyond that which is essential for its proper packing & prevention from deterioration.
- Crude Drug generally applies to the products from plant & animal origin found in a raw form.
- Crude drugs are further grouped as Organised (cellular) / unorganised (acellular) according to whether they contain a regular organised cellular structure or not.
- Organised drugs comprise those crude drugs materials which represent a part of the plant and are therefore, made up

of the cells.

— Unorganised drugs are a diverse group of solid & liquid materials which do not consist of parts of plants and are obtained from natural sources by a variety of extraction procedures.

⇒ In pharmacognosy, the crude drugs may be classified according to their

a.) Alphabetical status
b.) The taxonomy of plants & animals from which they are derived.
c.) Morphology
d.) The chemical nature of their active constituents
e.) chemotaxonomical status
f.) their pharmacological actions & therapeutic applications.

It should be noted that none of these systems, give a total profile of natural drugs & have their own limitations.

(1.) Alphabetical classification:

The crude drugs are arranged according to the alphabetical order of their Latin & English names.

Some of the Pharmacopoeias and reference books which classify crude drugs according to this system are as follows:

1.) Indian Pharmacopoeia
2.) British Pharmacopoeia
3.) British herbal Pharmacopoeia
4.) United States Pharmacopoeia & National formulary
5.) British Pharmaceutical Codex
6.) European Pharmacopoeia (Latin titles)

Eg: Acacia, benzoin, Cinchona, Dill, Ergot / Ephedra Etc.

(2.) Taxonomical (Biological classification):

— The drugs are classified according to the plants / animals from which they are obtained in Phyla, Order, Family, genera, species, subspecies etc.

- This method of classification is based on the classification i.e consideration of natural relationship/ phylogeny among plants / animals
- The crude drugs of plant origin are classified on the basis of one of the accepted systems of botanical classification.
- The drugs obtained from plants having alternative leaves, cymose flowers & fruits that are berries/ capsules (hyosyamus, Datura, Belladonna, stromanium) are considered with other members of Solanaceae.

Disadv:

This system fails to take into an account the chemical nature of active constituents & therapeutic significance of crude drugs.

(I.)

Phylum : Spermatophyta
Division: Angiospermae
Class : Dicotyledons
Order : Tubiflorae
Family : Solanaceae
Genus : Atropa, Hyosyamus, Datura
Species : belladonna, niger stromonium.

Scientific name : Atropa belladonna / Hyoscyamus niger / Datura stromonium.

(II.)

Phylum : Thallophyta
Class : Ascomycetes
Order : clavicepitales
Family : clavicepitaceae.
Genus : Claviceps
Species : purpurea.

Scientific name : claviceps purpurea

3) Morphological Classification:

The crude drugs are grouped according to the part of the plant / animal represented into Organised & Unorganised drugs.

The Organised drugs are divided into parts of plants like leaves, flowers, fruits, seeds, woods, barks, & subterranean parts like leaves, flowers, fruits, seeds, woods, barks, & subterranean parts like roots & Rhizomes. The unorganised drugs are dried latex, gums, exthacts, etc.

Some of the Examples are -

Seeds - Nux-vomica, Isabgol, Castor
Leaves - Senna, Digitalis, Vasaka, Eucalyptus
Barks - Cinchona, Cinnamon, Kurchi
Woods - Quassia, Sandalwood, Red Sander
Roots - Rauwolfia, Ipecacuanha, Aconite
Rhizomes - Turmeric, Ginger, Podophyllum
Flowers - Clove, Pyrethrum, Saffron
Fruits - Fennel, Coriander, Colocynth
Entire drugs - Ephedra, Ergot, Belladonna
Dried Latices - opium, papain
Resin & Resin combinations - Balsam of Tolu, Myrrh, Assafoetida, Benzoin.
Gums - Acacia, Tragacanth, Guar gum.
Dried juices - Aloe, kino, Red Gum
Dried Extracts - Gelatin, Catechu, Agar, Curare

⇒ This system of classification is more convenient for practical study especially when the chemical nature of the drug is clearly not understood.

4) Chemical Classification:

The crude drugs are divided into different groups according

to the chemical nature of their most important constituent.
Since the pharmacological activity & therapeutic significance of crude drugs based on the nature of their chemical constituents, it would appear that chemical classification of crude drugs is the prefered method of study.
The crude drugs containing alkaloids are grouped together, regardless of their morphology & taxonomical relationship.

Glycosides — Digitalis, Senna, Cascara
Alkaloids — Nux-vomica, Ergot, Cinchona
Tannins — Myrobalan, Pale-catechu, Ashoka
Volatile Oils — Peppermint, Clove, Eucalyptus
Lipids — Castor oil, Bees wax, Cod Liver oil.
Carbs & Derived products — Acacia, Agar, Honey, Pectin, Kokum butter
Resins & Resin combinations — Balsam of Tolu, Jalap, Benzoin, Colophony, Asafoetida
Vitamins & Hormones — Yeast, Vit-E, shark Liver Oil, Oxytocin, Insulin.
Proteins & Enzymes — casein, Gelatin, Trypsin, papain.

⇒ These may be considered to have some similarity in the chemical nature of active principles.

(5.) Therapeutic/ Pharmacological classification:
This system of classification involves the grouping of crude drugs according to their pharmacological action of their chief active constituents of their therapeutic uses.
The cascara, castor oil, Senna, Jalap, colocynth grouped together as purgatives / laxatives because of their pharmacological action. Regardless of Morphology, taxonomical status / chemical relationship, the drugs are grouped

together, due to their common pharmacological prop.

Some of the drugs could be classified under two pharmacological headings, since they exhibit two different actions.

For Example, cinchona is classified both as an anti-malarial & bitter tonic. & cardiac depressants.

1. Drugs acting on Gastro-Intestinal Tract:

Bitters — Quassia, Gentian, Cinchona
Carminatives — Dill, Mentha, Cardamom
Emetics — Ipecacuanha
Anti-Amoebics — Kurchi, Ipecacuanha
Bulk-laxatives — Agar, Isapgula, Banana
Purgatives — Senna, castor oil
Peptic ulcer treatment — Derivatives of Glycyrrhetenic acid (Liquorice), Raw Banana.

2. Drugs acting on Respiratory System:

Expectorants — Liquorice, Ipecacuanha, Vasaka
Anti-Expectorants — Stromonium leaves (Atropine)
Anti-tussives — Opium (codeine, Noscapine)
Bronchodilators — Ephedra, Tea (Theophylline)

3. Drugs acting on Cardio-Vascular System:

cardiotonics — Digitalis, Squill, Strophanthus
Cardiac depressants — Cinchona (quinidine), Veratrum
Vaso-constrictors — Ephedra, Ergot (Ergotamine)
Anti-hypertensives (Entire dodgs) — Rauwolfia.

4. Drugs acting on Autonomic Nervous System:

Adrenergics — Ephedra
Cholinergics — Physostigma, pilocarpus
Anti-cholinergics — Belladonna, Datura

5. Drugs acting on Central Nervous System:

Central Analgesics — Opium (Morphine)
CNS stimulants — Coffee (Caffeine)
Analeptics — Nux-Vomica, lobelia, Camphor
(for depression hyperactivity)

CNS Depressants – Hyoscyamus, Belladonna, Opium (Morphine, Codeine)

Hallucinogenics – Cannabis, Poppy latex

6. **Antispasmodics:**

Smooth Muscle Relaxant – Opium (papaverine), Datura, Hyoscyamus

Skeletal Muscle Relaxants – Curare (Alkaloidal Arrow poison)

7. **Anti-Cancer:**

Vinca, Podophyllum, Camptotheca, Taxus

8. **Anti-Rheumatics:**

Aconite (Wolf's Bane), Colchicum, Guggul (Commiphora wightii)

9. **Anti-helminthics:**

Quassia, Male fern (Dryopteris), ~~Wormseed~~, Vidang

10. **Immuno-Modulatory Agents:**

Tulsi, Aswagandha (Withania somnifera), Ginseng

11. **Drugs Acting on Skin & Mucous Membrane:**

Olive Oil, Wool fat, Bees Wax, Sesame Oil.

12. **Astringents:**

Myrobalan (Terminalia chebula), Black catechu.

13. **Anti-Malarials:**

Cinchona, Artemesia (mug worts Asteraceae)

14. **Immunizing agents:**

Vaccines, Sera, Toxoids, Anti-toxins

15. **Drugs acting ~~th~~ chemotherapeutically –**

~~Antibiotics~~

16. **Local Anaesthetics:**

Coca (Erythroxylum coca) — (COCAINE) (psychoactive alkaloid)

6. **Chemotaxonomic Classification:**

The "CHEMOTAXONOMY" has brought the plant chemist back to systematic botany in view of the fact that certain compounds have been found to characterize certain groupings

⇒ The chemotaxonomy establishes a relationship between position of the plant & attempts to utilise chemical facts for more exact understanding of the biological evolution & relationships.

⇒ The characters more often studied in chemotaxonomy are secondary metabolites of pharmaceutical significance such as Alkaloids, Glycosides, Flavonoids etc.

⇒ for example, the location of Berberine Alkaloids in Hydrastis distribution of Rutin & flavanoids in species of higher plants are of chemotaxonomical significance.

⇒ DNA HYBRIDIZATION, AMINO ACID SEQUENCING in PROTEINS & SEROTAXONOMY are also gaining significance in this method of classification.

Unit-4 Cultivation, Collection, Processing & Storage of Crude drugs

Cultivation may be defined as the production of crops (medicinal plants) using prepared land by tending them either by unskilled/skilled people.

→ The cultivation ensures quality and purity of the plants of medicinally important.
It gives higher yield of crude drugs.

→ Cultivation also helps in application of new techniques like hybridization, mutation & polyploidy which ultimately provides an improved quality of crop.

→ The crude drugs like cardamom, clove, Indian hemp, poppy latex, tea, fennel, saffron, ginger etc are obtained from cultivated plants.

ADVANTAGES OF CULTIVATION:

1.) It ensures quality & purity of medicinal plants. If uniformity is maintained in all operations during the process of cultivation, drugs of highest quality can be obtained. Systematic cultivation results in raising a crop with maximum content of volatile & other constituents. The Examples of ginger, turmeric liquorice can be listed to illustrate this point.

— If the cultivated plants are kept free of weeds, the contamination of crude drugs can be conveniently avoided.

2.) Collection of crude drugs from cultivated plants gives a better yield & theriapeutic quality.

→ If the collection of crude drugs for market is done from cultivated plants by skilled & well-experienced personnel, the high yield & therapeutic quality of drugs can be maintained. For eg: collection of latex from latex poppy & Oleo-resins from pinus species.

3.) Cultivation ensures regular supply of a crude drug. Cultivation is a method of crop planning. Planning a crop- cultivation regularizes its supply & as a result & the industries depending upon crude drugs, do not face problem of shortage of Raw materials.

4.) The cultivation of medicinal & aromatic plants also lead to industrialisation to a greatest extent. The cultivation of coffee & cocoa in Kerala has given rise to several cottage & small industries. The Government owned opium factory at Gazideab is a

testimony to the significance of well planned cultivation of poppy.

5) Cultivation permits application of modern technological aspects such as Mutation, polyploidy & hybridisation.

DISADVANTAGES:

The high cost of cultivated drugs as compared to wild sources & the losses due to ecological imbalances such as storms earthquakes, floods, droughts are the major disadv of cultivation.

Methods of propagation:

Medicinal plants can be propagated by two usual methods as applicable to non-medicinal crops

1) Sexual Method (Seed propagation)
2) Asexual Method.

1) Sexual Method: (Seed propagation)

In case of sexual Method, the plants are raised from seeds & such plants are known as SEEDLINGS

Advantages:

1) Seedlings are long-lived (in case of perennial drugs) and bear more heavily (in case of fruits). Plants are more sturdy.
2) Seedlings are comparatively cheaper & easy to raise.
3) Propagation from seed has been responsible for production of some chance-seedlings highly superior merits which may be of great importance to specific products such as orange, papaya etc
4) In case of plants where other vegetative methods cannot be utilised, propagation from seeds the only method of choice.

Disadvantages:

1) Generally, seedling-trees are not uniform in their growth & yielding capacity, as compared

to grafted trees.

2.) They require more time to bear as compared to grafted plants

3.) The cost of harvesting, spraying of pesticides, is more than the grafted trees.

4.) It is not possible to avail of modifying influence of root stocks on scion, as in case of vegetatively propagated trees.

(2.) Asexual Method:

In case of asexual method of vegetative propagation, the vegetative part of plant, such as stem/root, is placed in such an environment that it develops into a new plant.

Advantages:

1.) There is no variation between the plant grown & plant from which it is grown. As such, the plants are uniform is growth & yielding capacity. In case of fruit trees, uniformity in fruit quality makes harvesting & marketing easy.

2.) Seedless varieties of fruits can only be propagation vegetatively. Eg: Grapes, pomegranates & lemons

3.) Plant start bearing earlier as compared to seedless trees.

4.) Budding/grafting encourages disease-resistant.

5.) Inferior/unsuitable varieties can be overlooked.

Disadv:

1.) In comparision to seedling trees, these are not vigorous in growth & are not long-lived.

2.) No new varieties can be evolved by this method.

a.) **Vegetative propagation**: It is done by sowing various parts of the plants in well-prepared soil. The few examples are as follows:

1.) Bulbs: Squill, Garlic
2.) Corms: Saffron, Colchicum
3.) Tubers: Potato, Aconite
4.) Rhizomes: Ginger, turmeric
5.) Runners: Peppermint
6.) Suckers: Mint, pineapple, banana
7.) Offesets: Aloe, Valerian
8.) Stolons: Arrow-Root, liquorice

6.) Aseptic Methods of Micropropagation:

It is a novel method for propagation of medicinal plants. In micropropagation the plants are developed in an artificial medium under aseptic condition from fine pieces of plants like single cells, callus, seeds, Embryos, root tips, shoot tips, pollen grains etc. They are provided with nutritional, hormonal requirements.

Factors affecting cultivation:

Cultivation of medicinal & aromatic plants take cognizance of plant habitats & climatic requirements for their favourable growth.

The factors which are given special attention for cultivation as listed below:

1.) Altitude, temperature, humidity.
2.) Soil & soil fertilizers
3.) Rainfall & irrigation
4.) Fertilizers
5.) Pests & Pest Control.

1.) Altitude, Temperature & Humidity:

Altitude is a very imp factor in cultivation of medicinal plants. Tea, Cinchona & Eucalyptus are cultivated favourably at an altitude of 1000 - 2000 metres.

Cinnamon & Cardamom are grown at a height of 500 - 1000 meters, while senna can be cultivated at sea level.

Altitude for Drug Cultivation:

Plant	Altitude (metres)
Tea	1000 – 1500
Cinchona	1000 – 2000
Camphor	1500 – 2000
Cinnamon	250 – 1000
Coffee	1000 – 2000
Clove	upto 900
Saffron	upto 1250
Cardamom	600 – 1600

"TEMPERATURE" is another factor affecting the growth of a plant. Excessive temperature as well as frost also affect the quality of medicinal plants adversely. The following are few examples of range for luxuriant growth of certain medicinal plants. Camphor & coffee cannot withstand frost whereas saffron needs only cold climate & pyrethrum requires dry weather for cultivation.

2) Rainfall & irrigation:

Except the xerophytes plants like Aloe Cascara, acacia, most of the plants need either proper arrangement for irrigation or sufficient rainfall for their favourable development. In a few cases well distributed rainfall throughout the year is desired.

3) Soils & soil fertility:

SOIL is the most important natural resource as it supports growth of all plants. Soil provides mechanical anchorage as well as water & essential plant food elements for the plant Growth.

- The capacity of soil to supply plant nutrients in quantities & proportions required & to provide a suitable medium for plant Growth is known as SOIL FERTILITY.
- The commonly known soil is the shallow upper layer & is the friable material in which plants find foot-hold & nourishment.
- clay is one of the highly weathered portion of the soil, consisting of finest particles.
- This provides the soil adhesive &

& cohesive properties & also holds plant nutrients with the result that nutrients are not lost through leaching.

Particle Size (diameter)	Types of Soil
Less than 0.002 mm	Fine clay
0.002 to 0.02 mm	coarse clay/ silt
0.02 mm to 0.2 mm	Fine Sand
0.2 mm to 2.0 mm	Coarse Sand

4.) Fertilizers & Manures:

Plants also need food for their growth & development. What plants need basically for the growth are the Carbon-dioxide, Sun-rays, water & mineral matter from soil.

a.) Chemical fertilizers:

As animals are in need of vitamins, plants are in need of 16 nutrient Elements, for synthesizing various Compounds. Some of them are known as primary nutrients like N, P, K which are required in large quantities whereas secondary nutrients like Mg, Ca, S which are required in small quantities & Trace Elements like Copper, Manganese, Iron, Boron, Molybdenum, Zinc etc are also necessary for the plant growth are known as MICRO NUTRIENTS Carbon, Oxygen, Hydrogen & chlorine are provided from water & air.

b.) Manures:

Farm Yard Manure (FYM), castor seed cake, poultry Manures, neem & Karanj seed cakes Vermi compost are Manures. Oil-cake & compost normally consist of 3 to 6% of Nitrogen, 2% phosphates & 1 to 1.5% potash. They are made easily available for the plants.

Bone meal, fish meal, biogas slurry, blood meal, & press mud are the other forms of organic manures.

c.) Biofertilizers:

Inadequate supply, high costs & undesired effects if used successively are the demerits of fertilizers /

Manures & hence the cultivator has to opt for some other type of fertilizer.

Biofertilizers are the most suitable forms that can be tried. These consist of different types of micro-organisms / nitrogen in soil & plants can use them for their day to day use. Thus, they are symbiotic.

Eg. for biofertilizers:

1) Rhizobium
2) Acetobacter
3) Azospirillum
4) Blue-Green Algae
5) Azolla
6) Phosphorous solubilizing organisms.

5) Pests & Pest control:

Population increases in arithmatic progression, whereas the agricultural produce is enhanced in geometric progression. what man has reaped must be protected.

At the same time, future yields must be improved. But, unfortunately this is not so because, between the time a medicinal crop is harvested & consumed by Man, considerable quantity of crude drug is wasted / destroyed by pest. Also, loss in quality occurs when these pests are allowed to grow on the produce / yield. The control of pests thus, assumes primary importance in the context of cultivation of medicinal & aromatic plants.

PEST is an undesired animal / plant species & PESTICIDES are the chemicals derived from synthetic & natural sources effective in small concentrations against pests.

Types of Pests:

The different types of pests infesting medicinal plants are fungi, viruses, weeds, insects & non-insect pests including rodents.

1) FUNGI & VIRUSES: Diff. types of fungi are known to occur on medicinal plants

a.) Ascochyta atropae → It causes the formation of Greyish - white irregular spots which further causes necrosis of the leaves. The disease is called LEAF NECROSIS

b.) Cercospora atropae → causes round to angular brown spots with chest nut coloured Margins on both sides of the leaves. It is called as a LEAF SPOT.

c.) Phytophthora ~~atropae~~ nicotianae → It is a dreadful disease occuring on belladonna & other plants in which dropping of young leaves & branches, Yellowing of older leaves & drying of whole apical portion occurs. This disease is called as PHYTOPHTHORA ROOT-ROT.

d.) Phytophthora erythrosceptica → It causes dampling off in young seedlings & wilt-in matured plants. It causes black colouration of the root. The disease is called PHYTOPHTHORA ROT DISEASE.

(2.) INSECTS:

It is found that total no. of insect species in the world is larger than the total no. of species of all other forms of life put together. Various insect pests which attack medicinal plants that can be Enumerated here are

I.) Agrotis species, Heliothis armigera
Odontotermes obesus

⇒ Odontotermes obesus is the insect pests occuring on Mentha species.

⇒ Rauwolfia is attacked by
Diaphania nilgiraica
Indomia cretacens
Plantia viridicolis
& various beetles

⇒ Dill is attacked by Papilio machon
Hyadaphis coriandi

⇒ Belladonna losses leaves due to
Gonocephalum species
Agrotis flammatra

(3.) WEEDS:

A weed is an undesired plant. Weeds are considered as dreadful pests because losses due to them are estimated to be more than those occuring due to other pests & disease combined together. If the problem of control of weeds is not handled properly, it leads to loss of nutrients, water & light & space, increase in cost of labour & equipment, low product quality and problems in marketability., enhanced chances for attacks of bacteria, fungi, viruses & insects.

Some weeds causes allergies eg: Hay fever caused by ragweed, Mexican tea, Yellow dock, parthenium etc.

Some plants growing as weeds may be poisonous like Datura & Menispermum.

(4.) NON-INSECT PESTS:

They are grouped into two categories:

1.) vertebrates like rat, monkeys, birds, rabbits & hares, squirrels; antelopes, deer pigs, Etc.

2.) Invertebrates like nematodes, crabs, snails, mites & symphylids.

The rodents have sharp, gnawing incisor teeth which they cause considerable spoilage to stored crude drugs also the faecal matter of such animals causes serious contamination of crude drugs.

METHODS OF PEST CONTROL:

1.) MECHANICAL METHOD:

It employs manual labour alongwith different devices for collection & destruction of pest. The simple technique used are hand-picking, pruning, burning & trapping of pests. A proper approach is made for collection & destruction of eggs, loarae, pupae & adults of insects.

2.) AGRICULTURAL METHOD:

It covers advanced plant breeding techniques capable of inducing genetic manipulations resulting in production of pest-resistant species. It has achieved much success in producing hybrid varieties, which are resistant

fungal & bacterial attack, as compared to limited success with insects. Another aspect in agricultural control is ploughing which should be sufficiently deep so as to eradicate weeds, as well as, Early stages of insects.

3. BIOLOGICAL CONTROL:
This method is practised by combating the pests, mostly the insects, with other living organisms.
The latter is frequently the parasite form. If this method is properly defined, it may emerge as an effective, safe & Economic method of Pest control.

4. CHEMICAL CONTROL: The control of pests is brought about with the use of chemical pesticides, which include insecticides, fungicides, herbicides & rodenticides.
Because of toxic effects of all such chemicals used as pesticides, their use is regulated by insecticides Act in India.

The chemical pesticides are classified as:
1.) Rodenticides: warfarin, Red Squill
2.) Insecticides: DDT, gammaxine (Dichlorodiphenyl trichloro Ethane)
3.) Acaricides (Miticides): Tetradifon, chlorobenzoate
4.) Fungicides: chlorophenols, antibiotics
5.) Herbicides: Sulphuric acid, calcium arsenate

Collection & Processing of Crude Drugs:

After collection of the crude drugs, they are required to be processed prior to marketing. The reasons for preparation of drugs are to stabilize them in transport & storage & to ensure the absence of foreign organic matter & substitutes. Market preparation of crude drugs also takes care of pharmaceutical Elegance. While preparing drug for commerce several methods are adopted to meet the standard pharmacopoeial requirements.

Steps involved in Processing of crude drugs:

1) Collection
2) Harvesting
3) Drying
4) Garbling (Dressing)
5) Packing
6) Storage of crude drugs

1) Collection:

Irrespective of the type of crude drug & area of collection, there cannot be two opinions that the drugs are collected suitably when they contain maximum concentration of active constituents. The advantage of existing environmental conditions is also taken into consideration while collecting the crude drugs.

The drugs which constitute leaf & flowering tops of plants are collected just before they reach their flowering stage (maturity).

Eg: Senna, digitalis, Vinca, belladonna etc while Aloe are collected when they are sufficiently thick.

Flowers need to be collected just before pollination/ many a times, before their full Expansion.

Eg: Saffron, Clove buds.

They are usually collected in dry weather & preferably during morning hours.

Barks are generally collected in dry weather & preferably during morning hours.

Barks are generally collected in spring / early summer when cambium is active, as it is easy to detach them from the stem. Sometimes, they are collected in Autumn (Wild cherry) or in rainy season (cinnamon)

In some cases it cannot be replaced by any mechanical means.
Eg:- digitalis, tea, Vinca & Senna leaves.

The underground drugs like roots, rhizomes, tubers etc are harvested by mechanical devices such as Diggers / lifters

The tubers/roots are thoroughly washed in water to get rid off Earthy-matter.

Drugs which constitute all aerial parts are harvested by hinders for economic reasons.

Flowers, seeds & small fruits are harvested by a special device known as SEED STRIPPER.
The technique of beating plant with bamboos in which in case of CLOVES

3. Drying:

Before marketing a crude drug, it is necessary to process it properly, so as to preserve it for a longer time and also to acquire better pharmaceutical elegance. This processing includes several operations / treatments depending upon the source of crude drug and chemical nature.

Drying consists of removal of sufficient moisture content of crude drug, so as improve its quality & make it resistant to growth of microorganisms.

Drying inhibits partial enzymatic reactions.

Drying also facilitates pulverizing / grinding of a crude drug.

The Slicing & cutting into smaller pieces is done to enhance drying, as in case of glycyrrhiza squill & calumba

The flowers are dried in shade so as to retain their colour & volatile oil content.

Depending upon the type of chemical constituents, a method of drying can be used for a crude drug.

Drying can be of ② types:

1.) Natural Drying (Sun drying)
2.) Artificial Drying.

1.) Natural Drying:

In case of natural Drying, it may be either direct sun-drying / in shade. If the natural colour of the drug (Digitalis, clove, senna) & volatile principles of the drug (peppermint) are to be retained drying in the shade is preferred.

If the contents of the drugs are quite stable to the temperature & sunlight the drugs can be dried directly in sunshine (Gum acacia, seeds, fruits)

2.) Artificial Drying:

a.) An Oven (i.e) TRAY DRYERS
b.) Vacuum Dryers
c.) Spray Dryers

a.) Tray Dryers: The drugs which doesn't contain volatile oils are quite stable to heat / which need deactivation of enzyme are dried in tray dryers.

It facilitates the removal of water content of drugs (Belladonna Roots, Cinchona Bark, tea & raspberry leaves & Gums) are dried in this method.

b.) Vacuum Dryers: The drugs which are sensitive to higher temperature are dried by this process.

eg: Tannic Acid, digitalis leaves.

c.) Spray Dryers: Few drugs which are highly sensitive to atmospheric conditions & also to temperature of vacuum drying are dried by spray-drying method.

The technique is followed for quick drying of economically imp plant / animal constituents, rather than the crude drugs.

eg: Papaya latex, Pectin, tannins.

(4) Garbling (Dressing):

The next step in preparation of crude drug for market after drying is Garbling. This process is desired when sand, dirt & foreign organic parts of the same plant, not constituting drug are required to be removed. This foreign organic matter is removed in several ways & means available & practicable at the site of preparation of the drugs. If the Extraneous matter is permitted in crude drugs, the quality of drug suffers & at times, it doesn't pass pharmacopoeial limits. Pieces of iron must be removed with the magnet in case of castor seeds before crushing & by shifting, in case of Vinca & senna leaves.

Pieces of bark should be removed by peeling as in Gum Acacia.

(5) Packing:

The morphological & chemical nature of drug, its ultimate use & effects of climatic conditions during transportation & storage should be taken into consideration while packing in kerosene tins, while asafoetida is stored in well closed containers to prevent loss of volatile oil.

Cod Liver Oil, being sensitive to sunlight, should be stored in such a container which will not have effect of sunlight, whereas the leaf drugs like senna, Vinca & others are pressed & baled.

The weight of certain drugs in lots is also kept constant

Eg: Indian Opium

(6) Storage of crude drugs:

Preservation of crude drugs needs sound knowledge of their physical & chemical properties. A good quality of the drugs can be maintained

Unit-V Detailed Method of Cultivation of Crude drugs.

(1) PERI-WINKLE: family: Apocynaceae

Catharanthus rosens is cultivated in about 3000 hectares of land mainly in Tamil Nadu, Maharashtra, Karnataka, Andhra Pradesh. The yield of the roots per acre is approximately 250 kg to 500 kg depending on the nature of the soil & amount of irrigation provided.

(2) CINCHONA:

Cinchona officinalis belonging to family Rubiaceae. These plants were first cultivated in Nilgiri Hills in 1860. Four species of cinchona have been commercially introduced as plantation crops in Nilgiris & Darjeeling. The total area under cinchona plantation in India is approx 4500 hectares. The Governments of West Bengal & Tamil Nadu own Cinchona plantation & factories in India. The West Bengal factory is located at Mungpoo & the Tamil Nadu factory is in Anamalai hills.

(3) DIOSCOREA: family: Dioscoreaceae

Dioscorea deltoidea — is grown for its tubers throughout Himalayas at altitudes of 1000 meters. It is fairly common in Jammu & Kashmir, Himachal Pradesh & Parts of Uttar Pradesh. The depletion of natural forests has reflected in high Prices the drug companies have to pay since 1972 for the collection of tubers. In this view, a no. of drug companies like cipla, ciba, Searle & Wyeth have been taken up the cultivation of other species of Dioscorea, especially D. floribunda & D. composita around Bangalore & other places. A new composite clone of D. floribunda has been released for commercial cultivation by Indian Horticultural Research Institute (Bangalore) &

new grown in Goa, Tamil Nadu, Karnataka.

4. Isabgol:

Plantago ovata, family: Plantaginaceae is an irrigated rabi crop cultivated in Light sandy-loamy soil in approx 35,000 hectares land mainly in Banaskantha & Mehsana districts of Gujarat & to lessea extent in Pali, Jalore, Sirohi Districts of Rajasthan.

5. CASTOR OIL:

Ricinus communis, family: Euphorbiaceae is procured from seeds of Ricinus communis grown in Gujarat, A.P, Tamil Nadu.

6. RAUWOLFIA: family: Apocynaceae

The cultivation of Rauwolfia serpentina is restricted to small scattered locations in Maharashtra & Madhya Pradesh. At Dehradun, intensive cultivation is been done by one of the Private Pharmaceutical companies. The commercial supply of roots is more from the wild source

7. Ipecacuanha

Cephaelis ipecacuanha, belonging to family: Rubiaceae is mainly cultivated in Darjeeling in West Bengal. Currently the cultivation of Ipecac is monopoly of Government of West Bengal. The drug is also cultivated on a small scale in Sikkim & Assam.

8. INDIAN SENNA

Cassia angustifolia, family: Leguminosae Fabaceae is commercially cultivated in Tinnevelly, Madhurai & Ramanathapuram districts of Tamil Nadu.

The cultivation is reported on small scale in Cudappa district of Andhra Pradesh.

(9.) Poppy Plant:

Papaver somniferum belonging to the family: Papaveraceae is commercially cultivated in about 60,000 hectares in Eleven districts of Madhya Pradesh, Uttar Pradesh, Rajasthan. The yield of opium per hectare is apporx 30 kg. Poppy cultivation, opium processing & Marketing are controlled by the Narcotic Commissioner of India.

(10.) MENTHA: (Wild Mint)

Menthra arvensis belonging to the family: Lamiaceae is being cultivated commercially in districts of Kashipur, Rampur & Moradabad in Uttar Pradesh. It has been recently introduced in Punjab, Haryana, Madhya Pradesh, Orissa & Maharashtra.

Menthra Piperita (Peppermint) belonging to the family: Lamiaceae was first introduced by the Regional Research Laboratory, Jammu. It has been found that the plant can be successfully cultivated in the hills of Kashmir, Himachal Pradesh & Uttar Pradesh.

(11.) EUCALYPTUS:

Eucalyptus citriodora belonging to the family: Myrtaceae, the source of the Eucalyptus oil, is commercially grown in the states of Tamil Nadu, Karnataka, Kerala. The linaloe oil is obtained by distillation of the husk of the kernels of Bursera delpechiana

(12.) Cinnamon:

Cinnamomum zeylanicum belonging to the family: Lauraceae is grown in the evergreen forests of the western ghats of Konkan south of Tirunelveli at low altitudes. The cultivation of the plant is confined to lower elevations of Eastern ghats in Calicut, Cannanore, Kottayam districts of Kerala & Lower hills of Nilgiris in Tamil Nadu.

Isoquinoline Alkaloids:

Opium: (Dried Latex)

Syn: Raw opium, White opium, Kas-kas

B.S: It is the dried latex obtained by incision from unripe capsules of Papaver somniferum, dried / partly dried by heat / spontaneous evaporation. belonging to family papaveraceae. It contains not less than 9.5 per cent of morphine, ~~called~~.

Cultivation, Collection & Preparation:

Being a Potent narcotic drug, the cultivation & other aspects of opium are governed by resp. governments in diff. countries including India.

In India, all the activities about opium & its derivatives are controlled under Narcotic Drugs & Psychotropic Substances Act, 1985.

50 diff. species, (6)

Papaver somniferum. P. dubium.

P. orientale. P. argemone

In India, about 54 thousand hectares of land is under opium poppy cultivation.

The best climatic conditions for opium are cool weather without freezing temperature & cloudiness & sufficient sunshine

Opium poppy is grown from November to March.

Propagation is done by sowing the seeds, for which 3-4 kg of seeds per hectare are necessary.

Opium poppy requires, highly fertile well-drained loamy soil with fine sand

The soil should contain Organic matter, Nitrogen & should have pH ⇒ 7 (around)

After sowing, within 3-4 months, plant bears flowers, which are converted to capsules within few days & attain maturity after 15-20days

During maturity, opium capsules exudes more latex which change colour change from dark green to light green.

Such capsules with needle like apparatus — called "NUSHTUR".

Because of incisions, latex exudates out & thickens due to cold weather in night which is eventually scapped & collected next morning by an iron scoop called "CHARPALA".

The incision process is repeated for 4 times with 2-day interval

The latex is collected & in plastic containes

Dried in open areas & further the seeds are separated by beating

macroscopic characters:

Colour: Dark brown to chocolate brown

Odour: Strong characteristic

Taste: Bitter

Chemical Constituents:

The latex mainly contains alkaloids derived from amino acids
↳ Phenylalanine
tyrosine.

Narcotine,
Narceine,
papaverine
Morphine
Codeine
Thebaine.

Chemical test:

1) Morphine when sprinkled on Nitric Acid → Orange Red Colour
Codeine → Do not respond to this test.

2) Papaverine + HCl → Lemon Yellow
+HCl + Pot. Ferricyanide

Uses:

1) Opium — hypnotic sedative & Analgesic
2) Morphine → Potent analgesic.
3) Codeine → Relieves local irritation in bronchial tract & as Anti-tussive (in cough Medicines)
4) Papaverine → Smooth Muscle Relaxant

Aloe (Dried Juices)
Anthracene Glycosides

Syn: Aloe, Musabbar, Kumari

B.S: It is the dried juice of leaves of Aloe barbadensis Miller (Curacao aloe). belonging to family Liliaceae
Aloe perryi (Socotrine aloe)
Aloe africana (Cape aloe)

Cultivation & collection:

The genus Aloe consists of about 200 species, some of them are used as sources of Aloe.
For the cultivation, root suckers are used for propagation. The plants grow even in poor grades of soils and in dry climatic conditions.
water logging near the plant must be prevented.
The leaves are cut for the first instance in second year of cultivation

& the drug is obtained from leaves for twelve years.
After twelve years, the plants are completely harvested by uprooting & once again the land is worked for replantation.
During the collection of leaves a cut is given to leaves near their bases, by which juice located in parenchymatous cells of pericycle exudates out, due to the pressure exerted by Mucilage Cells

Preparation of Aloe :

1.) Curacao Aloe : It is prepared in (Barbados) Islands of Aruba & Bonaire in "WEST INDIES".
After giving the transverse cuts near the bases of fleshy leaves of Aloe barbadensis, the cut leaves are placed along the sides of V-shaped troughs. Because of spines on the leaves, they are put into kerosene tins immediately after cutting & kept in tilted position in wooden troughs, to drain out all the juice During boiling, in large copper pans the later evaporates & juice thickens
Then thick juice is poured in metal containers when it hardens.

2.) Cape Aloe : It is obtained from Aloe ferox in South Africa.
The transversely cut leaves are arranged in circular manner in basin shaped depression, dug in ground which is lined with goat skin.
It is kept in the same position for 5-6 hrs, till the juice exudates out & is collected in goat skin in solid form

3.) Socotrine Aloe : It is obtained from Aloe perryi occuring in island of Socotrine — East Africa. The juice of leaves is collected in goat skin & allowed to become semisolid in nature.

4.) Zanzibar aloe: It is a variety of Socotrine aloe. The juice is poured in skin of some small carnivorous animals, where it is solidified & packed in wooden boxes.
It is mentioned as Monkey-Skin Aloe, though the skin is not that of monkeys

Chemical constituents:
These are major sources of Anthraquinone glycosides.

- Aloin (Mixture of glycosides.)
- Barbaloin (water insoluble) → (Chief active const) → C-Glycoside

⇒ Aloe-Emodin anthrone (C-10) glycoside (water soluble)

⇒ Iso Barbaloin
β-Barbaloin
Aloe-Emodin
) Resins.
- Aloetic Acid
- Aloesone
- Aloesin
- Choline
- saponins
- Conjeayl alcohol

⇒ Aloesin → Purgative action

Chemical tests:

1.) Bromine test:
Freshly prepared bromine solution
↓
(filtrate) 1g of aloe powed + 10ml water
Kieselguhr ↓
Gives Pale Yellow ppt of tetrabromalin

2.) Schoenteteis Reaction: (Borax test):
Borax + filtrate
↓
Shaken well until Borax dissolves
↓
Few drops is added to test tube > filled with water > a green fluorescence appears

4.) Zanzibar aloe: It is a variety of Socotrine aloe. The juice is poured in skin of some small carnivorous animals, where it is solidified & packed in wooden boxes.
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Borax + filtrate
↓
Shaken well until Borax dissolves
↓
Few drops is added to test tube → filled with water → a green fluorescence appears

3.) Modified Anthraquinone test

$FeCl_3$ + dil. HCl (C-Glycosides)
↓ ↓
(Aloe-emodin)
Shaken with dil. NH_4OH → Rose-pink to cherry red (Ammoniacal layer)

Uses:

1.) Aloe → purgative agent.
effect is mainly on colon,
→ To counter effect griping action given with carminatives

2.) Aloetin → chief ingredient of tincture of Benzoin

3.) Aloe Gel → cosmetic products, Good Moisturizing, O/W prep

4.) Anti-inflammatory prop. due to Salicylates

5.) Aloe Gel — treatment of burns & wound

6.) Treatment of hair, Itchys.

Hemp:

Synonyms: Cannabis Indica, Indian hemp, Ganja, Marijuana, charas.

Biological Source:

Hemp is the pericyclic fibre; obtained from Cannabis sativa Linn belonging to family: Cannabinaceae

Morphological characters:

Colour: Yellowish Green/grey.
Odour: Odourless
Taste: Tasteless
Solubility: It contains 20% soluble & 80% Insoluble fiber which forms a Gel like substance in your gut.

Cultivation & Processing:

Hemp cultivation for fibre was recorded in china & was practised in Mediterranean countries of Europe.
Crops grow best in sandy loam with good drainage & ~~rainfall~~ rainfall of atleast 65mm throughout the growing season.

3.) Modified Anthraquinone test

$FeCl_3$ + dil. HCl (C-Glycosides) (Aloe-emodin)

Shaken with dil. NH_4OH → Rose-pink to cherry red (Ammonical layer)

Uses:

1.) Aloe → purgative agent. Effect is mainly on colon.

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Cultivation & Processing:

Hemp cultivation for fibre was recorded in china & was practiced in Mediterranean countries of Europe.
Crops grow best in sandy loam with good drainage & ~~rainfall~~ rainfall of atleast 65mm throughout the growing season.

Fibres are obtained by subjecting the stalks to series of operations — such as separating the fiber from core by crushing rollers & bruish rollers / hammer-milling, where separation of hard & bast fiber is known as "Decortification".

Chemical Constituents:

It consists of 77% of Cellulose & 10% — hemicellulose.

- It also consists of Minor constituents like ⇒ Lignin
  Pectin
  Wax
  Fat
  Fibre

Uses:

1.) In the production of textiles, clothing, Canvas, rope, cordage, archival grade paper, paper & construction materials.

2.) Long hemp fibres are used in clothing, home furnishing textiles, & floor coverings

3.) Short fibres are used in making insulation products, fibreboard & Erosion control mats

Plant products:

a.) Hallucinogen:

Hallucinogens are a large & diverse class of psychoactive drugs that can produce altered states of consciousness characterized by major alterations in thought, mood perception.

Hallucinogenic drugs, also known as PSYCHEDELICS are drugs that change the way a person perceives the world.

Hallucinogens effect all senses, altering a person's thinking, sense of time & Emotions.

Some occur naturally, in trees, vines, seeds, fungi & leaves & some are chemicals

Some Examples of hallucinogens include:

1.) LSD (Lysergic acid diethylamide)
2.) PCP (Phencyclidine)
3.) magic Mushrooms (psilocybin)
4.) ketamine
5.) Datura 6.) Morning Glory Seeds

b.) Teratogens:

A teratogen is any agent that causes an abnormality following foetal exposure during pregnancy.

Some Examples of teratogen are:

Some Medications
Recreational drugs.
tobacco products, Smoking.
chemicals
alcohol
Certain infections
Uncontrolled diabetes in pregnant people.

c.) Natural allergens:

Natural allergens are inciting agents of allergy i.e the substances capable of sensitizing the body in such a way that an unusual response occurs in Hypersensitive person

It may be of biological, chemical/ Synthetic origin.

The substances such as pollens, dander's, dust

Allergens are Protein / Glycoprotein.

Types of Allergens:

1.) Inhalant Allergens.
2.) Ingestant Allergens.
3.) Injectant Allergens.
4.) contactant Allergens
5.) Infectant Allergens.

(1.) Inhalant Allergens:

- Inhalant allergens are air-borne substances as chemicals, causing respiratory disease,
- Inhalant allergens caused by Environmental factors such as pollen, house dust, mites, moulds

Symptoms:

- Sneezing, Coughing.

(2.) Ingestant Allergens:

- Allergens which are present in food stuff & swallowed are learned ingestant.
- A food allergy is an immune system response to a food.
- Some most common food allergens ingested by patients are Milk, Egg, peanut, fish, shell fish, soy, wheat, Orange juice, cod liver oil

3. Injectant allergens:

- The injectants cause allergy in hypersensitive person, allergic conditions is known as Injectants allergy.

Symptoms — (1) Itching of palms of hands & feet
(2) Erythema
(3) Peeling of skin.

- The natural sources of injectable allergens are produced by sting of bees, hornets & wasps.

4. Contactant allergens:

Any allergens that produce manifestation of hypersensitivity at site of skin.

AEROALLERGENS: such as pollen, Brush fire, Grass fire

5. Infectant allergens:

Allergy caused by metabolic product of living micro-organism in human body.

- The continual presence of certain types of bacteria, protozoa, moulds, helminths.

Proteolytic Enzymes:

Proteolytic Enzymes (PROTEASES) are the Enzymes that breakdown the protein.
These Enzymes are made by animals, plants, fungi & bacteria.
Proteolytic Enzymes break down proteins in body / on the skin.
This might help with digestion / with the breakdown of proteins involved in swelling & pain.

1. Papain:

Syn: Papayotin, vegetable pepsin, bromasin.

B.S:

Papain is the dried & purified latex of the green fruits & leaves of Carica papaya belonging to the

family: Caricaceae

Morphological Characters:

Colour: White / Greyish-white
Odour: Odourless
Taste: Bland / characteristic
Solubility: Incompletely soluble in water & Glycerol.

Chemical Constituents:

Papain contains several Enzymes such as Proteolytic Enzymes peptidase I, polypeptides, rennin-like enzyme, clotting Enzymes similar to pectase. It contains 15.5% Nitrogen & 1.2% Sulphur.

Uses:

1.) Papain is used to prevent adhesions, in infected wounds, internally as protein digestant, as anathemalic (nematode)
2.) It is used in digestive mixtures, liver tonics, for reducing Enlarged adhesions, burns etc.

anseriformes

Unit - 13 Detailed Study of Oils.

Fixed / Fatty Oils:

These are the reserve food materials of plants & animals. Those, which are liquid at 15.5°C to 16.5°C are called as FIXED OILS. While those which are solid / semi-solid at above temperature are termed as FATS. Fixed oils, derived from the plant sources, occurs generally in seeds. They possess the following properties:

1.) Fixed oils are thick, viscous, yellow-coloured liquids with characteristic odour
2.) They are non-volatile and cannot be distilled.
3.) They do have food value & can be saponified.
4.) They turn rancid on storage due to free acidity.
5.) Fats and oils are esters of glycerol (three carbon trihydric alcohol) & various straight chained monocarboxylic acids, known as FATTY ACIDS.
6.) Physiologically, they are emmaollients & demulcents.

Eg: Vegetable sources → Arachis Oil, Castor Oil & Sesame Oil

Animal sources → cod Liver Oil, Shark liver Oil

The unsaturated fatty acids namely
- Oleic acid
- linolenic acid
- Arachidonic acid

are known as ESSENTIAL FATTY ACIDS, as they are not produced in the body & required to be provided in the diet.

CHEMICAL TESTS FOR IDENTIFICATION OF FIXED OILS/ FATS:

Fixed oils or fats can be confirmed by chemical test for glycerine which is produced by their hydrolysis. The test is performed as under:

a.) USING SODIUM HYDROXIDE:

1ml of 1% Cu SO4 soln + 5 drops of fixed oil
↓
Add 5 drops of 10% NaOH soln.
↓
A clear blue solution is obtained which shows glycerine is present in sample.
↓
The cupric hydroxide formed in the reaction does not precipitate out as it is soluble in glycerine.

b.) USING SODIUM HYDROGEN SULPHATE:

Take 5 drops of sample in a test tube
↓
Add a pinch of Sodium hydrogen sulphate
↓
Pungent odour indicates glycerine is present in sample

The PUNGENT ODOUR is due to the formation of "acrolein".

(1.) ARACHIS OIL:

Syn: Groundnut Oil, Peanut Oil.

B.S: It is fixed oil expressed from the seed kernels of cultivated varieties of Arachis hypogaea, belonging to the family: Leguminosae.

Method of Preparation:

Peanut kernels contain about 40 – 50% of fixed oil.

The graded & cleaned kernels are crushed and the oil is separated by Expression
↓
Further quantity of oil is collected by HOT EXPRESSION METHOD.
↓
Both fractions are mixed together.

↓

It is then allowed to stand for some time to separate stearin & filtered.

↓

The Oil is then treated with fuller's Earth or Carbon for bleaching & filtered thoroughly by using filter presses

Desc / Morphological Characters:

Colour – Pale Yellow coloured Liquid
Odour – Faint & characteristic
Taste – Bland & nut-like
Solubility – It is slightly soluble in alcohol & soluble in Solvent Ether, Chloroform & Light petroleum.

Chemical Constituents:

Arachis Oil consists of glycerides of fatty acids, Chiefly Oleic, linoleic, stearic and arachidic acid;

Others Acids — Lignoceric, palmitic acid.

Raw Oil may contain aflatoxin (a carcinogenic material produced by fungal Growth) & Colouring substances.

Refining of the oil removes colour, odour, impurities & aflatoxin, too. The polyunsaturated fatty acid content of this Oil is about 31%.

Chemical Test:

Under Ultra-Violet radiation, Arachis Oil shows BLUE FLUORESCENCE.

Uses:

1.) Peanut Oil is a solvent for intramuscular injections.
2.) Since it resembles to Olive Oil, it is used in the preparation of liniments, plasters & Soap
3.) Being a non-drying Oil, it is valuable as a Lubricant.
4.) It produces a firm & excellent white soap.
5.) Principally, it is used as an Edible Oil.
6.) Peanut cake / Peanut Oil meal is a rich source of proteins & contains about 39-45% of crude proteins.
7.) In the crude form, it is used as cattle food / as raw material for preparation of protein isolate.

Oleic Acid : $CH_3(CH_2)_7CH=CH(CH_2)_7COOH$

Palmitic Acid : $CH_3(CH_2)_{14}COOH$

Arachidic acid : $CH_3(CH_2)_{18}COOH$

CLASSIFICATION OF FIXED OILS:

Fixed Oils

NON-DRYING OILS	SEMI-DRYING OILS	DRYING OILS
1.) Olive Oil	1.) Castor Oil	1.) Linseed Oil
2.) Peanut Oil	2.) Mustard Oil	2.) Poppy Seed Oil
3.) Almond Oil	3.) Sesame Oil.	3.) Hemp Oil
4.) Croton Oil	4.) Rape Seed Oil	4.) Walnut Oil.
5.) Rice-bran Oil	5.) Cotton seed Oil	
	6.) Safflower Oil	

Non-Drying Oils:

It is an Oil which does not harden when it is exposed to air.

Drying Oils:

It is an Oil that hardens to a tough, solid film after a period of exposure to the air, at room temperature.

Semi-Drying Oils:

It is an Oil which partially hardens when it is exposed to the air.

2.) Castor Oil:

Syn: Ricinus Oil

B.S: Castor Oil is the fixed Oil obtained by the cold expression of the seeds of *Ricinus communis*, family: *Euphorbiaceae*.

Method of Prep:

Castor Oil can be prepared by two different methods, the first being the crushing of whole/decorticated seeds in
1.) power driven hydraulic presses
2.) The second one known as Ghani, which consists of manually operated screw press driven by bullocks.

For commercial extraction, the first method is adopted.

Thus the Oil is produced is a NON-MEDICINAL CASTOR OIL.

Morphological characters/Desc:

Colour – Pale Yellow/almost colourless liquid.

Odour – Slight & characteristic

Taste – First it is bland but afterwards slightly acrid, and usually nauseating

– It is a viscous & transparent liquid

- It is soluble in alcohol (an Exception to the category of fixed oils), miscible in Chloroform, Solvent Ether, glacial Acetic Acid, pet. ether.
- It is insoluble in mineral oil

Chemical Constituents:

Castor Oil chiefly contains triglyceride of ricinoleic acid (about 80%). Other Glycerides are also present in the drug, whereas fatty acids — isoricinoleic acid
linoleic acid
Stearic acid
isostearic acids

The viscosity of Castor Oil is due to Ricinoleic acid.

Castor Oil also contain heptaldehyde (heptanal)
undecenoic acid
sebacic acid.

Chemical tests:

1.) It mixes with half its volume of light petroleum ether [40-60°].
2.) Add to the oil an Equal volume of Ethanol, clear liquid is obtained. On cooling at 0°c and on storage for 3 hrs, the liquid remains clear
imp (distinction from other fixed oils)

Uses: [Cathartic property is due to irritant action of ricinoleic acid]

1.) Castor Oil is a cathartic
2.) It is also used for lubrication commercially
3.) Dehydrated castor oil (DCO) or hydrogenated castor oil (HCO) are used industrially for several other purposes.
4.) Turkey red oil & soaps are the other substances commercially prepared products, extensively used in textile industries.
5.) It is used in preparation of paints, enamel, varnishes, grease, polishes, printing ink, hydraulic & brake spirit with little modifications.
6.) Castor oil is often given orally or as aromatic castor oil or in the form of capsules.
7.) Castor oil imparts the transparency to soaps.

3. Olive Oil:

Syn: Oleum Olivae

B.S: It is the fixed oil Expressed from the ripe fruit of Olea europoea,

family: Oleaceae

- It is soluble in alcohol (an Exception to the category of fixed oils), miscible in Chloroform, Solvent Ether, glacial Acetic Acid, pet. ether.
- It is insoluble in mineral oil

Chemical Constituents :

Castor Oil chiefly contains triglyceride of ricinoleic acid (about 80%). Other Glycerides are also present in the drug, whereas fatty acids — isoricinoleic acid
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imp (distinction from other fixed oils).

Uses :

1.) Castor Oil is a cathartic drug [cathartic property is due to irritant action of ricinoleic acid]
2.) It is also used for lubrication commercially
3.) Dehydrated castor oil (DCO) or hydrogenated castor oil (HCO) are used industrially for several other purposes.
4.) Turkey red oil & soap are the other substances commercially prepared products, Extensively used in textile industries.
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3.) Olive Oil :

Syn : Oleum Olivae

B.S : It is the fixed oil Expressed from the ripe fruit of Olea europoea,

family : Oleaceae

Method of preparation:

- It is prepared by crushing and pressing the ripe fruits called "OLIVES".
- The entire olive consists of 20-30 percent oil and fruit pulp has 60-80 percent oil.
- The hydraulic presses are used to squeeze the oil out of fruit under low pressure.
- This type of technique is called cold pressing & it generates very little amount of heat, because of which it gives the best quality oil called "VIRGIN OLIVE OIL".
- The further pressing gives low quality oil
- The oil that comes from the last pressing is called "OLIVE RESIDUE" and is generally used for cosmetics, medicines etc.

Morphological Characters:

Colour – Pale Yellow / greenish-Yellow
Odour – Slight & characteristic
Taste – Bland, faintly acrid
Solubility – It is slightly soluble in alcohol & miscible with carbon disulphide, Chloroform & Ether

Chemical constituents:

Olive oil contains the triglycerides mainly in the form of olein, palmitin & linolein.

Chemical test:

1.) Under ultraviolet radiation it gives deep golden-Yellow colour, while refined oil gives pale blue fluorescence
2.) Decolouring with charcoal removes fluorescence

Uses:

1.) Externally, it is an Emollient & soothing agent for inflammed surfaces.
2.) It is used to soften the skin & crusts in Eczema & psoriasis.
3.) It is also used as an ingredient of Ear wax.
4.) Internally, it is used as a nutrient, demulcent & also as a mild laxative.
5.) It is used as a vehicle for oily suspensions for injection.

(4.) Chaulmoogra Oil:

Syn: Hydnocarpus Oil, Gynocardia Oil.

B.S: Hydnocarpus oil is the fixed oil obtained by cold expression method from ripe seeds of the plant Hydnocarpus anthelminthic, family: Placoontiaceae, prepared by cold expression method.

Method of Preparation:

Seeds are sub-ovoid, obtusely angular and 2cm in length. Chaulmoogra seeds contain 40-45% fixed oil. Seeds are decorticated by machine after grinding the kernels are pressed with the hydraulic press and oil obtained is filtered.

Morphological characters:

Colour - Yellow to brownish-Yellow coloured liquid

Odour - Characteristic

Taste - Some what acrid

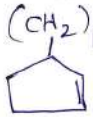
Solubility - Slightly soluble in alcohol, soluble in chloroform, Ether, benzene & Carbon disulphide.

It is Soft white Solid below 25°c.

Chemical Constituents:

It contains chemically esters of unsaturated fatty acids of Chaulmoogric Acid (27%) & hydnocarpic acid (48%) & glycerides of palmitic acid.

Chaulmoogric Acid.



Hydnocarpic Acid.

Uses:

1. The unsaturated fatty acids of chaulmoogra oil possess strong bactericidal effect, against Mycobacterium tuberculosis & M. Leprae.
2. It is found to be useful in the treatment of T.B, leprosy, psoriasis, & rheumatism.
3. It is intended only for external use.

(5.) Linseed Oil:

Syn: Flax seed, Linum.

B.S: This consists of fixed oil obtained from the dried fully ripe seeds of Linum Usitatissimum Linn, family: linaceae.

Method of Preparation:

1.) The variety yielding high Percentage of Oil is selected for extraction of Oil. Seeds are sieved to make free of Earthy matter and other materials.

2.) commercially, linseed oil is produced by use of expellers.

3.) Before the seeds are subjected to the expellers, they are rolled into meal, then moistened & heated by means of steam jacketed troughs filled over the expellers.

4.) An average yield of Oil is 30-35%.

5.) The expressed Oil is tanked for a long period, to settle the colouring matter & mucilage.

6.) The Oil is then treated with alkali immediately after filtration.

7.) Alkali treatment helps to remove free fatty acids.

Morphological Source:

Colour - Pale Yellow coloured clear liquid

Odour - characteristic

Taste - Pleasant

Linseed oil gradually thickens on exposure to air forming a thin transparent film.

Solubility - It is slightly soluble in alcohol, insoluble in water and miscible with ether, pet. ether and chloroform.

Chemical constituents:

1.) It contains the glycerides of palmitic, stearic, oleic, linoleic and linolenic acids.

2.) The unsaponifiable matter of the oil contains considerable quantities of sterols, tocopherol & squalene.

3.) Linseed also contain a cyanogenetic glycoside linamarin & mucilage (5%) in addition to fixed oil (20-40%).

Uses:

1.) It is the most important drying oil & hence, considerably large quantities are used for paints & varnishes.

2.) Medicinally, it is mainly recommended for external applications like lotions & liniments. It is used in treatment of scabies and other skin diseases alongwith sulphur.

3.) Since, it has very high iodine value, it is used in preparation of non-staining iodine ointment & other products like cresol with soap.

4.) It is nutritive & emollient too.

5.) Industrially, it is an important oil used for various purposes such as in the manufacture of soap, linoleum, greases, polishes, plastics, polymers etc.

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6. **Shark liver Oil:** Vit-A

Syn: Oleum selachoids.

BS: Shark Liver Oil is the fixed oil obtained from the fresh & carefully preserved livers of various species of the shark, mainly Hypoprion brevirostris & Galeorhinus zyopterus.

Method of preparation:

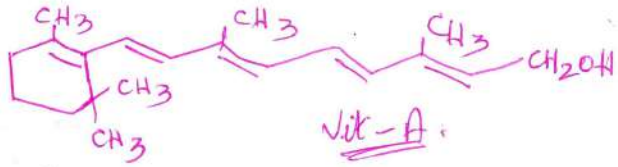
1. The livers of the shark are cleaned & minced.
2. The minced mass is taken to a boiling pot, where the temperature of 80°C is maintained.
3. The oil extracted is treated with dehydrating agent to remove traces of water.
4. The oil is then taken to the vacuum still for dehydration & chilled to separate stearin.
5. centrifuges are used to seperate suspended materials in oil.
6. The clear oil is manipulated to adjust the desired strength of vitamin A.
7. The oil being sensitive to light & air, all the while, care is taken to minimize the exposure to sunlight & air.
8. Many a times, the livers are stored at a very low temperature, until they are taken for processing.

Morphological characters:

Colour — Pale Yellow to brownish-Yellow
Odour — Characteristic fishy, but not rancid.
Taste — bland to fishy.
Solubility — Shark liver Oil is soluble in solvent ether, chloroform, & light petroleum.
It is insoluble in water & slightly soluble in Ethyl alcohol

chemical constituents:

Shark liver Oil contains of Vit-A.
The conc. of Vit. A in the oil varies from 15000 - 3000 ± IU per g (International Units)
Other constituents of oil are glycerides of the saturated & unsaturated fatty acids.



Vit-A.

chemical test:

(1.) Dissolve 1 ml shark liver Oil in 1 ml chloroform & treat with 0.5 ml Sulphuric acid. It acquires light violet colour changing to purple and finally to brown (due to Vit. A)
(2.) Dissolve 1 ml shark liver Oil in 10 ml chloroform & treat with saturated solution of antimony trichloride in chloroform. Shake it well. A Blue colour is developed (due to Vit. A)

Uses:

(1.) It is used in the deficiency of Vit. A.
(2.) It is also known as anti-xeroptthalmic factor (dryness of conjuctival & cornea of eye, associated with Vit-A deficiency)
(3.) It is also nutritive.
(4.) Pharmaceutically, it is used in the preparation of oil shark liver oil, shark liver oil emulsion, shark liver oil with Vit. D.
(5.) It is used in burn & sunburn Ointments.

(7.) Cod Liver Oil: Vit-D.

Syn: Oleum morrhi.
B.S: It is processed from fresh liver of cod fish, Gadus morrhua and other species of Gadus (family - Gadida

Method of preparation:

1. The fishes are caught by nets, opened & livers are separated.
2. The healthy livers free from gall bladders are washed, minced, steamed in steam jacketed vessels or "kars" at a temperature not exceeding 85°C for half an hour, cooled & buried in snow for several days.
3. Special barrels are used for this cooling process, which results in separated of stearin.
4. The steaming of oil destroys enzyme lipase.
5. The Medicinal oil after filteration is kept in well-closed air-tight containers in a cool place protected from light.

Morphological characters:

Colour – Pale Yellow thin liquid
Odour – fishy
taste – Slightly fishy becoming disagreeable on exposure to air

Solubility: Freely Soluble in chloroform, Ether, CS_2, pet. Ether & slightly Soluble in alcohol.

Chemical Constituents:

- The medicinal value is due to Vit-A & Vit-D group.
- It contains glyceryl esters of
  - Oleic acid
  - linoleic acid.
  - gadoleic.
  - myristic acid
  - palmitic acid.
- Cod liver oil also contains 7%, Eicosapentaenoic acid & 7%. docosahexanoic acid. (both of them are Omega-3 fatty acids)

Uses:

1) It is used in the deficiency of vit A & D groups.
2) The oil is used as source of vitamins, as a nutritive.
3) It is used in treatment of rickets & TB.
4) The nutritional requirements for polyunsaturates in diet, coupled with blood cholesterol reducing property of oil.

(8) Sesame Oil:

(1) **Syn:** Teel Oil, Gingelly oil, Benne Oil

B.S: It is the fixed oil obtained by expression from the seeds of *Sesamum indicum* belonging to the family: Pedaliaceae

Method of Prep:

Sesame seeds contain about 50% of fixed oil. Only white variety of seeds is used for pharmaceutical purposes. Seeds are very small in size. They are cleaned, washed, sun-dried & expressed to yield oil at room temperature. Subsequently, the temp & pressure are raised. The oil is purified by refining method & used.

Morphological characters:

Colour – Pale Yellowish liquid.
Odour – Slight, characteristic
Taste – Bland
Solubility – It is slightly soluble in alcohol, miscible with Chloroform, solvent Ether, light petroleum & Carbon disulphide

Chemical constituents:

Gingelly oil contains glycerides of higher fatty acids mainly oleic, linoleic, palmitic, stearic & Arachidonic acids. It contains about 5% of olein, & phenol known as *SESAMOL* which is responsible for stability of oil. It also contain lignan derivatives i.e Sesamin & sesamolin.

Chemical tests:

Shake 2 ml sesame oil with 1 ml 1% solution of sucrose in hydrochloric acid. A pink/red colour is produced, due to sesamol.

Uses:

(1.) It is nutritive, laxative, demulcent & has got emollient properties (2.) It is used in the preparation of liniments, plasters, ointments & soaps, similar to olive oil.

(3.) Pharmaceutically, it is used as a vehicle for intramuscular oily injections.

(4.) After learning, sesame oil yields high quality black ink.

(9.) Safflower Oil:

B.S: It is a fixed oil obtained from the ripe & dry seeds of *Carthamus tinctorius* family: Compositae.

Method of Preparation:

For expression of oil, the seeds from promising varieties in India namely A-300, S-7, 13-3 are selected, cleaned & further processed. About 1000 seeds of safflower weigh 20 to 50 g. The seeds normally contain 35 to 38% of fixed oil. The oil is prepared by expression in expellers or with the help of hydraulic presses. The oil is filtered & further purified. The seed meal / ground seeds are subjected to cooking by means of open steam, which ensures maximum yield of oil. The filtered & decolourized oil is packed into suitable containers.

Morphological characters:

Colour – faint Yellowish clear liquid.
Odour – characteristic
Taste – characteristic.

Solubility – Slightly soluble in alcohol & freely soluble in ether, chloroform, benzene & pet. Ether.

Chemical constituents:

Safflower oil contains glycerides of palmitic (6.5%), stearic acid (3.0%), arachidic (0.296%), oleic acid (13%), linoleic (76–79%), linolenic acids (90.15%). The polyunsaturated fatty acid content of the oil is highest (75%) & is said to be responsible to control cholesterol level in the blood, & thereby reduces incidence of heart attacks.

Uses:

1.) The edible oil is used in the manufacture of oleomargarine, as a dietary supplement in hypercholesteremia & also in treatment of atherosclerosis. Due to its high linoleic acid content, it is consumed for preparation of vegetable ghee.

2.) Industrially, it is used for preparation of soft-soap varnishes, linoleum & water-proofing material.

(10.) Rice Bran Oil:

Synonym: Rice Oil.

Biological Source: Rice bran is the cuticle existing between the rice & the husk of paddy & consists of Embryo & Endosperm of seeds of Oryza sativa

family: Graminaceae

Method of Preparation:

The quality of rice bran oil depends upon the time which elapses between milling of the rice and removal of oil from the bran. Rice bran contains an ractic enzyme lipase, which raises the free fatty acid content on storage. The oil obtained from fresh bran is of good quality & has good flavour & low free fatty acid content. Therefore solvent extraction plant for rice bran oil should be set as nearer as possible to rice milling so as to process out the rice bran oil quickly

Morphological characters:

Colour - Golden Yellow oil.

Odour - characteristic

Taste - characteristic

Solubility - insoluble in water but soluble in common fat solvents.

Chemical Constituents:

Rice bran oil contains 20-25% of saturated & 80-85% of unsaturated fatty acids as glycerides. Main fatty acids are Oleic (40-50%), linoleic (30-40%) & palmitic (12-18%). The oil contains Squalene & antioxidants like tocopherols.

Uses:

1) Since it contains antioxidants, its storing quality is very good.

2) It is used in manufacture of cosmetics & as an emollient.

3) It is an edible oil & used in preparation of vegetable ghee

(11.) Cotton Seed Oil:

B.S: It is fixed oil obtained from the dried, matured seeds of cultivated varieties of Gossypium herbaceum

family: Malvaceae

Method of Preparation:

For the manufacture, the seeds are steamed & placed in hydraulic presses, where about 14.5kg of oil is expected from about 0.9 metric ton of the seeds. The defatted seeds & hulls are used as food for livestock.

Morphological characters:

Colour: Pale Yellow.

Odour: odourless.

Taste: Bland & Oily in nature

Solubility: Slightly soluble in alcohol & miscible with Ether, carbon disulphide, chloroform & pet. Ether.

Chemical constituents:

It contains triglycerides of fatty acids, mainly palmitic acid, Oleic, linoleic acid

Uses:

1.) Cotton seed oil is a pharmaceutical aid (Solvent) in solid state as a substitute for lard.

2.) It is used for prep of cosmetics, hydrogenated fats, emollients. It is also used as edible oil for cooking / preparation of Margarine.

3.) It is Employed as pediculicide, acaricide & laxative in veterinary medicine.

12.) Corn Oil:

Synonym: Maize Oil, Mazola Oil.

Biological Source:

It is the fatty oil obtained from Embryos of the grains of Zea Mays belonging to the family: Graminae.

Method of Preparation:

1.) The Maize grains/ fruits (caryopsis) of Maize are made up of 80-82% Endosperm, 10% germ (Embryo) & 5-7% caryopsis. The germ (Embryo) contains 40% fixed oil.

2.) During the manufacture of corn starch by wet milling, corn oil is obtained as a by product.

3.) The Oil rich embryos (i.e germs) are separated by flotation.

4.) The germs are washed thoroughly to make them free of starch, subjected to high pressure & heat to liberate the oil.

5.) The product, thus obtained, is filtered & refined by usual methods of settling, refrigeration & clarification

Morphological characters:

Colour – light Yellow coloured liquid
Odour – characteristic
Taste – characteristic
Solubility – Slightly soluble in alcohol, fully soluble in chloroform, ether, benzene & pet. Ether

Chemical Constituents:

Maize oil contains the glycerides of linoleic, linolenic, oleic, palmitic, stearic acid.

Unsaponifiable matter contains γ-tocopherol & sitosterols.

Crude oil contains about 2% of phospholipids. It contains natural anti-oxidant in the form of Vit-E (tocopherol)

The stability of corn oil is supported by high level of natural antioxidant ferulic acid. Corn oil also contains ubiquinone (Co-Enzyme Q), which is reported to have antioxidant activity.

Uses:

1.) It is used as solvent for injection & high-calorie dietary supplement.
2.) It is also used in ~~Cosmetics~~ cosmetics & preparation of Margarine.
3.) The corn oil is a source of essential fatty acids.
4.) It is used in lowering Blood Cholesterol & source of Vit. E.

13.) Black Mustard oil:

Syn: Sarson ka tel.

Biological Source: It is a fixed oil obtained from matured Mustard seeds of Brassica nigra / Brassica juncea belonging to the family: Cruciferae/ Brassicaceae

Method of Preparation:

The Oil is prepared by Expression.

Morphological characters:

Colour: Yellow coloured liquid
Odour: strong acrid odour
Taste: Acrid.
Solubility: slightly soluble in alcohol, miscible with pet. Ether, CS_2,

chloroform.

Chemical constituents:

Mustard oil contains glycerides of arachidic, behenic, eicosenoic, erucic, lignoceric, linoleic, linolenic, oleic & myristic acids.

Black Mustard seeds contain 35-40% of fixed oil & a glycoside known as sinigrin alongwith an enzyme myrosin. The Myrosin acts on sinigrin in presence of water & produces potassium acid sulphate & allyl isothiocyanate.

Allyl thiocyanate is responsible for the strong acrid smell of volatile oil of mustard produced on hydrolysis of glycoside.

Uses:

Fixed oil is used as edible oil after refining, but medicinal properties are due to allyl isothiocyanate, which is local irritant & Emetic.

If applied externally, it is rubefacient & vesicant.

It is also used as condiment & in manufacture of soaps.

Refined Mustard oil is used in

14.) **Poppy Seed Oil:**

Syn: Poppy oil

B.S: It is the fixed oil obtained from poppy seeds i.e dried seeds of Papaver somniferum belonging to family:

Papaveraceae

The seeds are collected from the poppy capsules, the fruits of opium poppy. The countries wherein opium poppy is collected, the seeds are produced commercially.

Morphological characters:

Colour — Pale Yellow coloured liquid

Odour — Pleasant odour.

Taste — pleasant

Solubility — Slightly soluble in alcohol, fully miscible with chloroform, pet. Ether.

Chemical constituents:

The oil is free of all narcotic alkaloids of opium. The oil is rich source of linoleic acid & contains about 73% of it. In addition, it contains palmitic (10%), arachidic (0.5%) & oleic (12%) acids.

Uses:

Its taste is similar to olive & hence

bitters, which are sulphur containing compounds, nimbidin, nimbin, nimbinin & nimbidol. The unsaponifiable part contains nimbosterol (0.03%)

Uses:

Nimbin, nimbidin, & related compounds possess anti-viral activity.

As a non-edible oil, it is used for soap-making & for manufacture of oleic acid & stearic acids.

It is indicated in rheumatism & also as a pesticide & in medicated soaps for skin diseases.

It is also spermicidal.

17.) Wheat Germ Oil:

Biological Source: It is the fixed oil from wheat germ, Triticum aestivum (Graminae), obtained by solvent extraction or hydraulic expression.

Morphological characters:

Colour: Bland Yellow oil.
Odour: Nut-like
Taste: Nut-like & Bland
Solubility: miscible in Ether, benzene, petroleum ether & chloroform.

Chemical Constituents:

Wheat germ oil contains saturated fatty acids (4.7%), linolenic acid (44.1%), linoleic acid (10.8%), oleic acid (30%), & unsaponifiable matter upto 4.7%. Vit-E is the main constituent of unsaponifiable matter. The oil contains upto 0.5% of Vit. E.

Uses:

It is used as nutritional supplement & also used as source of natural Vit-E & unsaturated fatty acids (Vit-E)

18.) Jojoba Oil:

Synonym: Hohoba oil.

Biological Source: Jojoba oil is a mixture of liquid wax ester from the seeds of Simmondsia chinensis, family: Buxaceae obtained by extraction of ground seeds.

Morphological characters:

Colour – Golden Yellow coloured liquid
Odour – characteristic
Taste – characteristic

Chemical constituents:

1.) Jojoba seeds constitute about 45-55% of liquid wax ester

2.) It is not a triglyceride but mixture of long-chain esters & therefore referred to as wax.

3.) About 97-98% of the oil consists of esters of C-18, C-20, C-22, C-24 chain monounsaturated acids & alcohols,

4.) These acids & alcohols are similar to those present in sperm whale oil.

5.) Two ester molecules containing 40 & 42 carbon atoms make upto 80% of the oil.

6.) It contains small amounts of tocopherols which contribute to its stability in the air.

7.) The minor constituents include phytosterols

8.) It is stable & not oxidised at room temp / high temp.

Uses:

1.) It is substitute for sperm whale oil because of similarities between the oils.

2.) In U.S, whale hunting & import & use of whale is banned by the Government,

3.) Due to this, jojoba oil has become valuable substitute for sperm whale oil in cosmetics, lubricants & various industrial chemicals

4.) Due to partial isomerisation / hydrogenation of double bonds of jojoba oil, it becomes a creamy product & is found to be a good carrier in dermatological preparations.

5.) commercially jojoba oil is used as a lubricant

19.) Evening Primrose Oil:

Synonym: King's cureall

Biological Source: This consists of fixed oil obtained from the ripe, dried seeds of plant known as Oenothera biennia **family:** Onagraceae

Morphological characters:

Colour: Golden Yellow clear & transparent liquid

Odour: characteristic peppery

Taste: Bland

Solubility: Insoluble in alcohol, soluble in Ether & chloroform.

Chemical Constituents:

It contains 72% linoleic acid & 9% gamma - linolenic acid (GLA).

It is known to be richest natural source of GLA.

Both LA & GLA are essential fatty acids & essential in formation of prostoglandins

Uses:

1.) It is used in the form of dietary supplement & cosmetics

2.) Therapeutically, evening primrose oil is useful for those who lack the capacity to enzymatically convert linoleic acid & Gamma - linolenic acid.

3.) It is clinically useful as prostaglandin precursor.

4.) It has been also found to be useful in controlling severity of premenstural syndrome & used in Eczema.

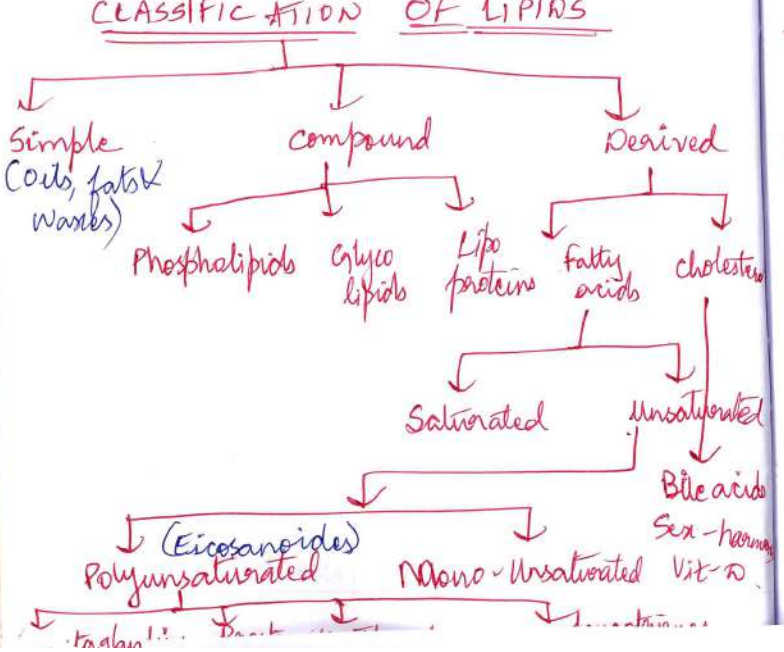
5.) The pain reduction of arthritis, Controlling liver & kidney damage due to alcohol, controlling complications of diabetes, multiple sclerosis.

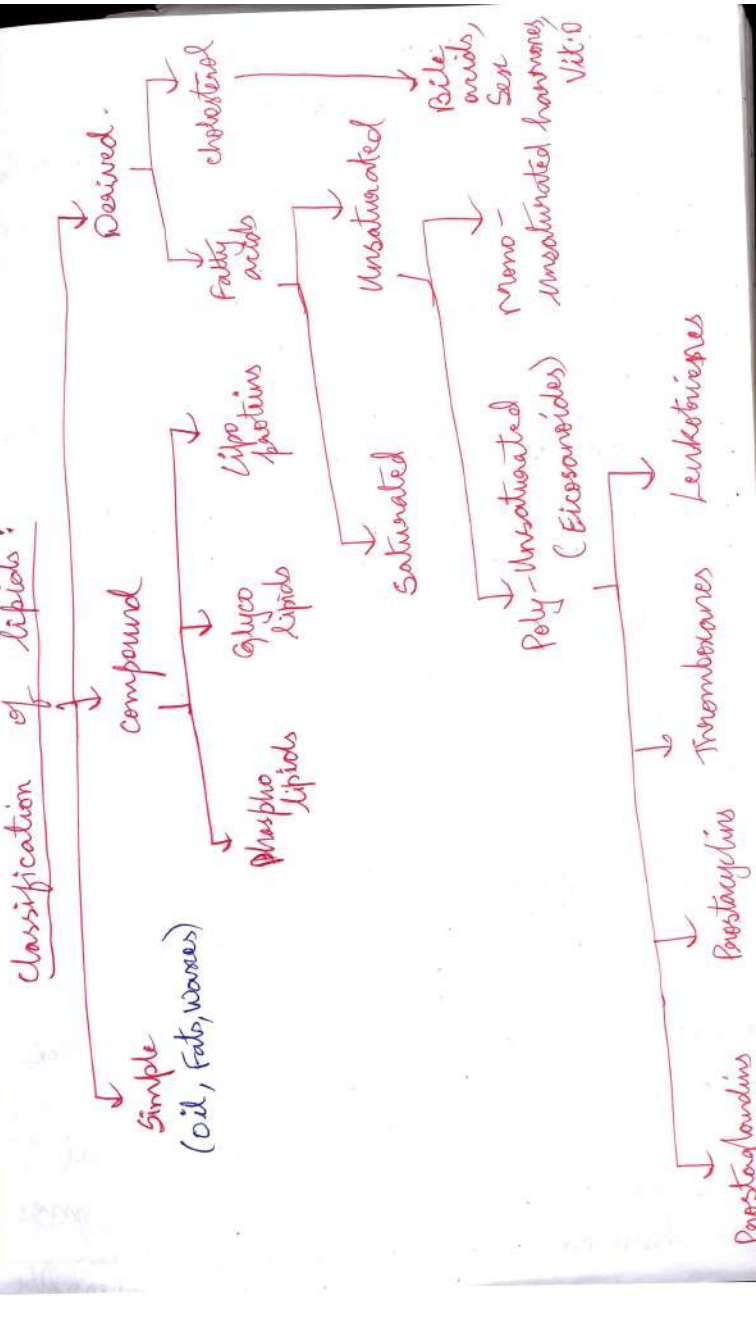
Unit - (12) Definition, Sources, Method of extraction, chemistry & Method of Analysis of lipids.

"LIPIDS" are the substances of animal/plant origin & comprise of fixed oils, fats & waxes.

The basic function of oils & fats is storage of energy, apart from their several uses in medicine & industries. They are obtained by expression/extraction methods.

CLASSIFICATION OF LIPIDS





Waxes:

Waxes are unctuous (excessively flattering/oily), fusible, variably viscous solid substances, with characteristic waxy lustre. These are esters of fatty acids with high weight monohydroric alcohol, such as cholesterol, Cetyl alcohol, melissyl alcohol, etc.

They are insoluble in water, but soluble in most organic solvents.

They are obtained from Vegetable & animal Sources.

a.) Vegetable — Seasal wax, Carnauba Wax, Japan Wax, & bayberry wax

b) Animal — Spermaceti, bees wax, Wool fat.

Difference between Fats & Waxes:

The difference between fats & waxes is that fats may be saponified by either aqueous/alcoholic alkali, but WAXES → are only saponified by alcoholic alkali.

⇒) Waxes are unsuitable for internal consumption since there are no enzymes in human body to hydrolyse them internally.

Analytical Parameters for Oils & fats:

The properties of oils & fats vary along with the degree of unsaturation, average molecular weight & also acidity from hydrolysis.

1.) Iodine Value: It is defined as the weight of iodine absorbed by 100 parts by weight of the sample of fat/oil. Iodine value is a measure of the Extent of unsaturation. Susceptibility to rancidity increases for the oil or fat having higher iodine values.

2.) Saponification value: It is defined as the number of milligrams of potassium hydroxide required to neutralize the fatty acids resulting from complete hydrolysis of 1g of the sample of oil/fat. Saponification value occurs in an inverse proportion to average molecular weights of fatty acid present in oil.

3.) Hydroxyl value:- It is defined as number of milligrams of potassium hydroxide required to neutralise the

acetic acid capable of combining by acetylation with 1g sample of fat/oil.

4.) Unsaponifiable matter: It is the matter present in the fats & oil, which after saponification by caustic alkali & subsequent extraction with an organic solvent, remains non-volatile on drying at 80°c. Paraffin hydrocarbons can be detected by this method as adulterants.

5.) Acid Value: It is defined as the number of milligrams of KOH req. to neutralise the free acids present in 1g sample of fat/oil. Generally, rancidity causes free fatty acids liberation, hence acid value is used as an indication of rancid state.

6.) Peroxide value: It is a measure of peroxides present in oil. Peroxide values are generally less than 10 mEq/kg in fresh samples of oil. Due to temperature / storage, rancidity occurs causing increase in peroxide values

7.) Ester value: It is defined as no. of milligrams of KOH required to combine with fatty acids which are present in glyceride form in 1g sample of oil / fat. Difference between saponification value & acid value is Ester value.

(1.) Cocoa Butter:

Syn: Theobroma oil, cacao butter

B.S: It is a fat obtained from roasted seeds of Theobroma cacao belonging to the family: Sterculiaceae.

Method of Prep:

1.) Cocoa seeds contain about 50% of cocoa butter.

2.) The seeds are separated from pods and are allowed to ferment wherein the seeds change their colour from white to dark reddish-brown due to enzymatic reaction.

3.) The fermentation process takes place at 30-40°c.

4.) The process of fermentation is carried out in tubes, boxes / in the cavities made in the earth for 3 to 6 days.

5.) After fermentation, the seeds are roasted at 100-140°c, which looses water & acetic acid from the seeds & facilitates removal of seed coat.

6.) The seeds are then cooled immediately and are fed to nibbling machine to remove the shells followed by winnowing
7.) The kernels are then fed to hot rollers which yield a pasty mass containing cocoa butter.
8.) This is further purified to give cocoa butter.
9.) The cocoa shells are processed further to yield an alkaloid.

Morphological characters:

Colour – Yellowish-white solid.
Odour – pleasant chocolate
Taste – pleasant chocolate
Solubility – It is insoluble in water but soluble in ether, chloroform, benzene & pet. ether.

Chemical Constituents:

It consists of glycerides of stearic (34%), palmitic (25%), oleic (37%) acids & small amount of arachidic & linoleic acids. The non-greasiness of the product is due to its glyceride structure.

Uses: It is used as a base for suppositories, ointments & manufacture of creams & toilet soaps.

(2) Gossypol:

B.S: It is a pigment found in the oil of seeds of cotton Gossypium herbaceum belonging to the family Malvaceae.

Morphological characters:

Colour – Non-volatile Yellow pigment
Odour – Bland
Taste – Bland
Solubility – It is insoluble in water but soluble in alcohol, ether & chloroform.

Uses:

1.) Gossypol is a male contraceptive agent due to its antispermatogenic activity. It has been well studied in China for this purpose.
2.) But it is poisonous in nature as it reduces oxygen carrying capacity of blood in non-ruminent animals
3.) It also shows insecticidal properties.
4.) Gossypol has been investigated for spermicidal, anti-viral, antiprotozoal & anti-tumour activity.

(3.) Yellow Bees Wax :

Syn: Bees Wax, Cera-flava

B.S: Yellow Bees wax is purified wax & obtained from honey comb of the bees Apis mellifera & other species of Apis, belonging to family Apidae

Method of preparation :

1.) The combs & cappings of honey comb are broken & boiled in soft water. These are then enclosed in a porous bag weighed to keep under water.

2.) The boiling causes oozing of the wax, which gets collected outside the bag & forms a cake after cooling

3.) The debris on outer surface is removed by scraping.

4.) Bees wax is purified by heating in boiling water / dilute sulphuric acid & settling.

5.) The process is repeated several times & finally wax is skimmed off.

6.) Various techniques are adopted to bleach wax such as treatment with hydrogen peroxide, Chromic acid, ozone etc.

7.) Sometimes, treatment with charcoal, chlorine / potassium permanganate is also given to bleach the wax.

8.) Natural bleaching by exposing the wax to the sun-light in thin layers is also preferred.

Morphological characters :

Colour : Yellow to Yellowish Brown

Odour : Agreeable & honey-like

~~Taste~~ : Agreeable & Honey like

Solubility : Insoluble in water, soluble in hot alcohol, Ether, Chloroform, Carbon tetrachloride, fixed & volatile oils

Chemical Constituents :

1.) It consists of esters of straight-chain monohydric alcohols with straight chain acids.

2.) The chief constituent of bees wax is myricin i.e myricyl palmitate (about 80%)

3.) Free cerotic acid (about 15%) small quantities of melissic acid & aromatic substance cerolein & other constituents.

4.) Indian bees wax is characterized by its low acid value, while European bees wax has the acid value of 17 to 22

Uses:

1.) Bees wax is used in Preparation of Ointments, Plasters & polishes 2.) It is used in ointment for hardening purposes & manufacture of candles, moulds, & in dental & Electronic industries.

2.) It is also used in cosmetics for preparation of lip-sticks & face creams.

3.) Pharmaceutically, it is an ingredient of paraffin ointment I.P.

White bees Wax: Obtained by bleaching Yellow bees wax, should not be used for opthalmic purposes.

4. Carnauba Wax:

Syn: Brazil Wax

B.S: It is an exudate from pores of the leaves of Brazilian wax-palm tree Copernicia prunifera, Copernicia cerifera belonging to family: palmae

Morphological Characters:

Colour: hard greenish solid wax
Odour: sharp characteristic odour
Taste: bland taste
Solubility: soluble in fat solvents.

chemical constituents:

It contains esters of hydroxylated fatty acids, i.e carnaubic acid & cerotic acid & melissyl cerotate.

Uses:

1.) carnauba wax is used for preparation of cosmetic products, depilatories & deodorant sticks.

2.) It is also used for tablet coating.

3.) High quality shoe polishes & automobile waxes are other products made from carnauba wax.

5. Suet:

Syn: Sevum, Multon-suet.

B.S: Medicinal suet is the internal fat of abdomen of sheep Ovis aries belonging to family: Bovidae.

Morphological Characters:

Colour: White solid fat
Odour: Slight odour.
Taste: Bland if it is fresh, but becomes rancid after long exposure to air.
Solubility: It is soluble in chloroform, Ether & light petroleum & insoluble in alcohol & water.

Chemical constituents:

It mainly consists of palmitin & stearin (about 75-80%), along with olein (20-30%)

Uses:

It is used as ointment base

⑥ Lard:

Syn: Adeps

B.S: It is the purified internal fat obtained from the abdomen of the hog Sus scrofa belonging to family: Suidae

Method of preparation:

1.) The Omentum & parts of peritoneum containing Lard are washed thoroughly & minced to break the membranous vesicles.
2.) It is subjected to temperature of about 50-55°C to melt the lard.
3.) It is then separated by passing through muslin cloth.
4.) Cooling is done with proper stirring.
5.) The entrapping of air should be avoided which otherwise helps to develop rancidity on storage

Morphological characters:

Colour: White, homogeneous fatty mass
Odour: Slight odour
Taste: Bland taste
Solubility: It is insoluble in alcohol & soluble in benzene, carbon disulphide Ether & chloroform

Chemical constituents:

chemically, it contains about 60% olein & 40% of stearin & palmitin

Uses:

1. It is used as an ointment base & in formulations where more effective absorption is desired.
2. Benzoinated Lard contain benzoin resin as preservative.

⑦ Spermaceti:

Syn: Spermawax, cetaceum.

B.S: It is a waxy substance obtained from the head of sperm whale Physetea macrocephalus & other species of Physeter, belonging to family: Physeteridae

Method of Preparation:

1.) Sperm oil is secreted in a large special cavity above the right nostril in the jaw of sperm whale.
2.) The cavity is emptied after the animal is captured.
3.) The oil on cooling deposits the crystalline mass known as spermaceti

Morphological characters:

Colour: Translucent pearly white masses.
Odour: Odourless
Taste: Tasteless
Solubility: Soluble in Oils, chloroform, Carbon disulphide, boiling alcohol, but insoluble in petroleum Ether & water.

Chemical Constituents:

Spermaceti chiefly contains cetyl palmitate, free cetyl alcohol & esters of lauric, myristic & stearic acids.

Uses:

It is mainly used as an emollient & in preparation of ointments, specially cold-creams.
Cetyl alcohol is a valuable Emulsifying agents.

(8.) Lecithin:

Syn: Vitellin, Lecithol, Phosphatidylcholine
Biological Source: commercial lecithin consists of acetone-insoluble phosphates of phosphatidyl choline phosphatidyl ethanolamine (cephalin), phosphatidyl serine & triglycerides, fatty acids. It should not contain not less than 50% of acetone insoluble matter.
It is mainly obtained from soybean-oil. It is also available in several vegetable seeds, egg yolk, corn & from of animal brain & nervous tissue.

Morphological characters:

Colour: waxy, white substances.
Odour: characteristic
Taste: Tasteless
Solubility: Insoluble in acetone, soluble in other organic solvents.

Unit – IV. PROTEINS

Proteins are complex nitrogenous organic substances of plant & animal origin. They are of great importance in the functioning of living cells.

They are essential food stuffs, like carbs & fats, they also provide very imp group of therapeutically active compounds such as harmones, enzymes, sera, antitoxins.

They are easily extractable from plant sources & are generally stored in the form of aleurone grains in plants.

In animals, they are present as structural material in the form of collagen (connective tissue), keratin (hair, wool, nail, feathers, horns), elastin (epithelial connective tissue), casein (milk) & plasma proteins.

Properties of Proteins:

1.) Proteins contain C, H, O, N & rarely sulphur.

2.) The ultimate products of complete hydrolysis of proteins, either by chemical reagents / enzymes, are amino acids.

3.) Proteins are the compounds of high molecular weight, forming colloidal solution in water.

4.) Proteins are amphoteric in nature & get easily denatured due to heat, changes in pH, treatment of organic solvents or by ultraviolet radiation.

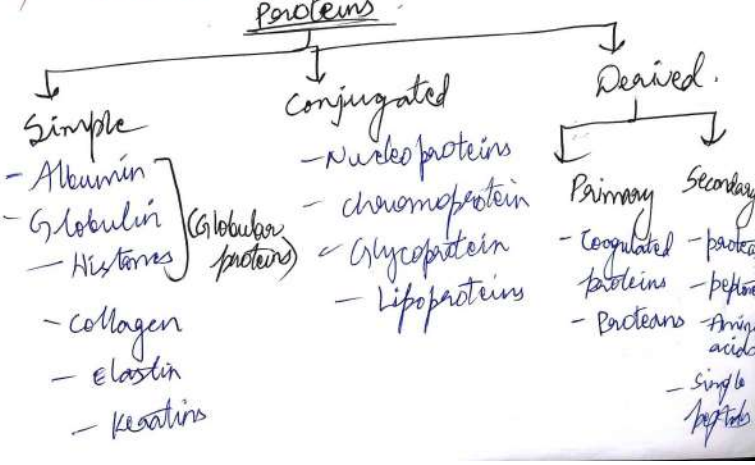
classification of Proteins:

Depending upon the products of hydrolysis, they are classified as

1.) simple proteins (containing only amino acids).

2.) conjugated proteins (amino acids & non-amino acids like nucleic acids, lipids, metals & phosporic acid)

3.) Derived proteins.



1.) Malt Extract:

B.S: It is a product obtained by extracting malt / malted barley, which is the partially & artificially germinated grain of one/ more varieties of barley grain, Hordeum vulgare belonging to family Graminae

malted wheat

Morphological characters:

Colour — Yellowish - brown / amber Colour viscous liquid
Odour — characteristic
Taste — sweet
Solubility — Colloidal solution in Water

Chemical Constituents:

Along with proteins, it also contains maltose (50%), dextrin, glucose & amylolytic Enzymes.

Uses:

It is used as nutritive & flavouring agent for masking bitter taste.
It is mainly used as a vehicle for preparation of cod liver oil & halibut liver oil (Vit-A) source)
(Hippoglossus vulgaris)

2. Protamine Sulphate.

B.S: It is a purified mixture of different simple proteins obtained from the sperm matured testes of fish, Salmo salar, belonging to the family Salmonidae

Morphological characters:

Colour: White / grey yellow crystalline powder
Odour: Astringent
Taste: Astringent
Solubility: Sparingly soluble in water & alcohol, while insoluble in Ether and chloroform

Uses:

Protamine sulphate is a heparin antagonist & used to counteract the effects due to heparin overdosage like haemorrhage.

3. Heparin Sodium (Soluble Heparin)

B.S: It is a sterile preparation of active glycosaminoglycans, which are present in mammalian tissues like lungs & intestinal mucosa.

Morphological characters:

Colour: white hygroscopic powder
Odour: Odourless
Taste: Tasteless

Solubility: It is soluble in water, saline, alcohol, glacial acetic acid & acetone.

Uses:

1.) Heparin has a significant role in mammalian body as a natural anticoagulant, thereby maintaining the fluidity of the body.

2.) Heparin is mainly used as an anticoagulant in vascular surgery & sometimes in blood transfusions.

3.) It is used in treatment of arterial & venous thrombosis.

4) Absorbable Surgical suture:

It is also called as SURGICAL CATGUT / CATGUT SUTURE.

It is a sterile strand prepared from collagen, which is derived from healthy mammals / from a synthetic polymer.

It is available as flexible strand which varies in diameter, size, colour & capable of getting absorbed into the living mammalian tissue.

The extent of absorption is varied by certain modifications.

It is coated with a suitable anti-microbial substance & is coloured with suitable colouring agent approved under Drug Act.

5. Non – Absorbable Surgical Suture:

It is a sterile / non-sterile strand of material that is suitably resistant to action of living mammalian tissue.

It may be modified to reduce capillarity, suitably bleached & also coloured with approved colouring agents. It is coated with an anti-microbial agent.

The various materials used in preparation of non-absorbable surgical suture are silk / synthetic fibre of braided construction, cotton / multifilament metal wire

6) Gelatin:

Syn: Gelatina, Gel foam, puragel.

B.S: Gelatin is a protein extracted by partial hydrolysis of animal collagenous tissue like skins, tendons, ligaments & bones within boiling water.

Morphological characters:

Colour: faintly Yellow to amber colour
Taste: Tasteless
Odour: Odourless / characteristic
Solubility: It is insoluble in cold water, but soluble in hot water. It is soluble in mixture of Glycerine & water, but insoluble in fixed & volatile oils, alcohol, chloroform & ether.

BLOOM STRENGTH: The quality of the gelatin is expressed as Bloom strength. It is the weight in gramme, which when applied to a plunger, 12.7 mm in diameter, under controlled conditions shall produce a depression exactly 4 mm deep in a jelly matured at 10°C & containing 6.66 % w/w gelatin in water.

Method of Preparation:

1.) For the manufacture of gelatin, the bones are to be defatted & decalcified with org. solvent & mineral acid respectively.
2.) The material obtained by this treatment is treated with water at 85°C in successive quantities, due to which collagen dissolves into gelatin.
3.) It is further bleached & concentrated under reduced pressure to specific gelatin content & allowed to set in shallow trays.
4.) Such moulded gelatin is dried in drying room to eliminate moisture.

chemical tests:

1.) It evolves ammonia when heated with sodalime.
2.) It is precipitated by Trinitrophenol & solution of tannic acid, but not with alum, lead acetate / acids which indicates that it does not contain chondrin.

3.) It gives a white precipitate with mercuric nitrate & on warming turns to brick red colour.

Chemical Constituents:

It is a protein which contain different aminoacids out of which the major constituent is LYSINE, an essential amino acid but does not contain tryptophan. Gelatin is composed of gluten protein.

Uses:

1.) Gelatin is mainly used in manufacture of hard & flexible capsule shells.
2.) It is also used for preparing pessaries, pastes, suppositories
3.) Gelatin is also used for preparation of bacteriological culture media, absorbable sponge & Gelatin film.
4.) Used for weight loss, for healing osteoarthritis, osteoporosis (brittle bones), rheumatoid arthritis.
5.) Strengthens bone, joints, finger nails

7.) **Casein:** (Milk protein)

B.S: Casein is a principal phosphorous protein in milk & constitutes 3.0% Milk.

There are (2) types of casein in the market. These are:

i.) Acid casein
ii.) Rennet casein.

Acid casein: Warm-skimmed milk is acidified with dilute acid, the whey is separated, curd is washed several times, dried & pulverized

Rennet casein: Skimmed milk is treated with an enzyme, rennet extract, product is separated & purified.

Morphological characters:

Colour: White coloured powder
Odour: Odourless
Taste: Characteristic
Solubility: It is insoluble in water, soluble in dilute alkalies, conc. acids but precipitates from dilute acid solutions.

Uses:

- It is useful dietary supplement source of protein in pre & post operative care
- Industrially, it is used in sizing of textile & paper as an adhesive
- In preparation of casein plastic & Casein paints

8.) Yeast:

Yeast is a collective term for fungi which under normal conditions of growth contain a vegetative body of simple individual cell.

Syn: Brewers Yeast, Baker's Yeast

B.S: It consists of unicellular fungal microorganism Saccharomyces cerevisiae / Saccharomyces ellipsoideus is food juice, bread & several fermented / fermenting media. On large scale, Yeast is produced by using citrus, molasses molasses waste, grain, wood etc

Method of Preparation:

Various substrates are used for the Commercial production of Yeast as mentioned. But common & industrially used are beet & cane - molasses. A suitable strain like Saccharomyces cerevisiae is grown & it is transferred to sterilised substrate.

Chemical constituents:

The Yeast contains about 65-85%. of moisture, Nitrogenous compounds glycogen, fat, vitamins & ash, Vitamins reported are from Vit B group i.e thiamine, riboflavine, nicotinic acid, pantothenic acid, folic acid, biotin etc. The enzymes invertase, diastase, Zymase & maltose are present in Yeast.

Uses:

- The Yeast is used in manufacture of alcohol, beer & various wines
- It is used in bread industry.
- It is a great source of protein.

9. Cobra Venum.

B.S: It is the dried secretion obtained from the "POISON GLAND" of Naja-naja & other species of Naja belonging to the family colubridae.

~~It contains not less than 50 mg~~

Method of Prep:

Immediately after extraction the poison is freeze-dried. It is then pooled mixed, dissolved in ice cold water for injection & filtered through bacteria proof filter to give stock solutions.

Chemical Nature:

Cobras belong to sub group known as Elapids. Elapids contain post synaptic neurotoxins that spread rapidly in the victim's blood stream causing respiratory failure & eventually death.

There are four types of venom that act on the body—

a.) Proteolytic venom
b.) Haemotoxic venom
c.) Neurotoxic venom
d.) cytotoxic venom

- Viper venom acts on vascular system & brings coagulation of blood & clotting of pulmonary arteries. The pain of wound is severe it is of burning character & speedily followed by swelling of limb & discolouration

Uses:

It is used as local haemostatic.

10. Collagen:

Syn: Osseln

B.S

10. Kavach: (monkey tamarind)

Syn: Cow itch plant, cowhage

B.S: This consists of dried seeds of Mucuna pruriens / Mucuna pruriata Hook Linn belonging to the family Fabaceae

Morphological characters:

Colour: Seeds are black in colour.

odour: odourless

Taste: Bitter

Solubility: It forms a colloidal solution in water

Chemical Constituents:

Seeds contain good number of aminoacids including L-dopa — 1.5% (L 3,4 dihydroxy phenyl alanine)

Licithin (12.5%), alkaloids mucunine, mucunadine, pruriencine, proveniriine & fat

Uses:

Levodopa is the drug of prime importance in treatment of incapacitating paralysis agitans (parkinsonism). Levodopa shows maximum effects in rigidity & hypokinesia.

The drug abolishes / suppresses conditions like dysphagia, sialorrhea, postural instabilities, speech difficulties.

The side effects of levodopa are Nausea, vomiting, anorexia, epigastric pain, flatulence & dry mouth.

Unit-5. Fibres, Sutures & Surgical Dressings

The fibres are defined as the elongated thick walled cells with pointed ends, cell walls of which consist of cellulose & may / may not contain lignin. In medical practise, they are used as surgical dressings made up of natural / artificial materials.

Apart from three natural sources, such as plant, animal & mineral, fibres are now synthesised chemically from various materials. Fibres obtained from various sources

a.) Plant Fibres — Jute, Flax, banana, Cotton, hemp

b.) Animal Fibres — Silk, wool

c.) Regenerated & Synthetic fibres — Nylon, terylene, orlon

(I.) Fibres regenerated from CARBS — Alginate yarn, artificial silk or rayon

(II.) Fibres regenerated from PROTEIN materials — Aralid from groundnut protein & fibrolin from milk casein

c) Synthetic — Nylon, terylene, Orlon

d) Mineral fibres — Glass, asbestos

A) Plant Fibres:

(1) Cotton:

Syn: Raw cotton, Cotton wool, Surgical cotton, Absorbent cotton

B.S: Cotton consists of epidermal trichomes/hairs of seeds of cultivated species of the Gossypium herbaceuae, belonging to the family Malvaceae

Method of Preparation:

1.) The plant after flowering, bears fruits known as CAPSULES.
2.) The fruits are 3 to 5 celled
3.) Each capsule contains numerous seeds.
4.) The seeds coved with the hairs known as BOLLS.
5.) These Bolls are collected dried & taken to the ginning press, wherein the trichomes are separated from the seeds. Various devices are used to separate the hairs.
6.) The hair with short length are known as LINTERS and are used for the manufacture of absorbent cotton, while long length are used in the preparation of the cloth.
7.) The raw cotton obtained by this way is full of impurities like wax, fat, colouring matter, vegetable debris.
8.) It is then processed to get rid off most of the impurities.
9.) It is taken to the machine known as COTTON OPENER & followed by the treatment with dil. Soda solution/ Soda ash solution under pressure for about 10 - 15 hrs. The wax, fatty matter & Colouring matter are removed by this treatment.
10.) Later it is washed with H_2O & treated with suitable bleaching agent.
11.) It is again washed with H_2O, dried & carded into flat sheets.
12.) It is finally packed in wrappers & sterilized by means of Gamma radiations

Morphological characters:

Colour – white (due to bleaching)
Odour – Odourless
Taste – Tasteless
Solubility – It is soluble in 70% H_2SO_4

Chemical constituents:

Raw cotton contains about 90% of cellulose, 7-8% of moisture, wax, fat & remains of Protoplasm
Purified cotton / absorbent cotton is Entirely cellulose, with 6-7% of moisture

Chemical tests:

1.) Ammonical copper Oxide solution (Cuoxam-reagent) dissolves raw cotton fibres with formation of balloons, while absorbent cotton dissolves completely with uniform swelling
2.) Cotton is insoluble in dilute sodium hydroxide solution & HCl (distinction from silk. It is soluble in 60% of H_2SO_4
3.) Soak cotton fibres in iodine water & dry. Add few ml of 80% sulphuric acid – fibres assume purplish-blue or bluish-green colour (distinction from jute, hemp, wool, silk, nylon, alginate yarn, acetate rayon).

Uses:

Cotton is used as a filtering medium & in surgical dressings. It is also used as an insulating material.
Absorbent cotton absorbs blood, mucus, pus & prevents the wounds from infections

(2.) Jute:

B.S: It consists of Phloem fibres of the stem of various species of Corchorus olitorius & Corchorus capsularis belonging to the family Tiliaceae

Chemical constituents:

The fibres contain cellulose (53%), hemicellulose (20%) & lignin (10%). The middle lamella is highly lignified & gives red colour with phloroglycinol & HCl

Morphological characters:

Colour: Yellowish in colour
Odour: Odourless
Taste: Tasteless
Solubility: It is soluble in H_2SO_4

Uses:

It is used in manufacture of tows (stupa) / wet cloth / sponge charged with medication for external application), padding splints, filtering, & straining medium.

Jute fibres are used for preparation of coarse bags

3.) Flax:

B.S: These are pericyclic fibres obtained from stem of plant Linum usitatissimum belonging to family Linaceae

Morphological characters:

Colour: Yellowish Brown
Odour: Odourless
Solubility: ~~Soluble in~~ 2/3rd is insoluble
1/3 is soluble in 0.5g ~~solvent~~
Taste: Tasteless

Uses:

The seeds of the plant are good source of fixed oil & mucilage.

Fibres are lustrous with sufficient tensile strength.

The chemical nature of fibres is known to be pecto-cellulose

The fibres are earlier used in manufacture of lint, but at present cotton has replaced these fibres.

It is used in preparation of rugs, lace, lawn & filtering medium.

B) Animal Fibres:

4.) Silk:

B.S: These fibres are obtained from the cocoons of Bombyx mori (mulberry silkworm) belonging to family ~~Anthoraceae~~ Bombycidae

Method of Preparation:

1.) The larvae of silkworm produce silk fibroin fibres from glands in their mouth.

2.) This fibroin gets united with gum-like secretion known as SERICIN & forms Cocoon.

3.) These cocoons are not allowed to grow further into an insect, but are heated to 60-80°C by exposing to steam.

4.) The exposed cocoons are put into hot

water to dissolve the gum & to separate the fibres.

Morphological Characters:

Colour: Fine, smooth Yellow in colour
Odour: Odourless
Taste: Tasteless
Solubility: Silk is soluble in Cuoxam solution, H_2SO_4 (66'1.) & conc. HCl
[distinction from wool]

Chemical Constituents:

Silk contains a protein known as FIBROIN. Fibroin on hydrolysis yields amino-acids glycine & alanine.
It does not contain sulphur & hence the test with lead acetate is negative.

Chemical Test:

Uses:

In manufacture of special types of sutures, sieves & ligatures are prepared from silk.

5.) **Wool:** Lanolin (wool fat)

B.S: Wool / wool fibres are obtained from the fleece of sheep
Yellow waxy subs secreted by sebaceous glands of wool-bearing animals like sheep

Ovis aries belonging to family **Bovidae**

Method of preparation:

1.) The hair, forming the fleece of sheep are removed at shearing time.
2.) They are then processed to remove the wool fat & dirt
3.) The clean & defatted wool is subjected to bleaching, washed again & dried

Sheep's wool contain 45'1. fat known as suint, which must be removed. Lanolin is separated & washed with H_2SO_4. & purified & bleached. The product is known as anhydrous wool fat.

Morphological characters:

Colour: Smooth, Elastic, lustrous (Yellow)
Odour: Odourless
Taste: Tasteless
Solubility: Insoluble in 66'1. of H_2SO_4, conc. HCl & Cuoxam soln. (insoluble in water) but forms turbidity with ether & chloroform

Chemical test:

2'1. chloroform is gently poured over surface of conc. H_2SO_4, it deeply purple-red coloration at junction of liquids.

When lead acetate is added to soln of wool in caustic soda, a black ppt is formed having high sulphur content (distinction from silk).

Chem. Const:

It contains alcohols, cholesterol, various esters. Also contain acids lanoceric, carnaubic, oleic, myristic, palmitic acids.

Chemically, wool contains sulphur containing protein known as KERATIN.
Keratin is rich in amino acid Cy-

D.) Synthetic fibres:

7.) Nylon (polyamide):

It is the polymer of adipic acid & hexamethylene diamine.
The fibres are highly lustrous to dull, white/coloured. — Colour
When applied to flame, the fibre melts with formation of bead.
Solubility — Soluble in 90% formic acid & phenol (90%), which distinguishes it from fibres of biological origin

Uses:

It is being used for filter cloths, sieves & non-absorbable suture.

8.) Terylene:

It is a polymer of Ethylene glycol & terephthalmic acid.
Terylene may be distinguished from nylon in that it retains its structure on boiling with phosphoric acid.

Uses:

It is being used for artificial graft & also as non-absorbable suture.

E.) Mineral Fibres:

9.) Glass Fibres:

The fibres consists of sand (Silica) mixed with oxides of aluminium, calcium, boron & magnesium. They are unaffected by all usual reagents used in identification of fibres. They melt at high temperature & form a transparent bead.
They are used in filter fabrics for insulation & splinting material.

10.) Asbestos:

It contains mainly hydrated magnesium silicates. Rock asbestos is white, Yellow / Green in colour. It is highly refractive and do not fuse when heated.

Uses:

It is used for prep of a filtering medium & for bacterial filters

Surgical Dressings

The word surgical dressing is used to include all materials either used alone / in combination to cover the wound.

The purpose of application of dressing is to protect the wound & favour its proper healing.

A material which holds the dressing in desired position is known as BANDAGE

Fibres are used for preparation of SURGICAL DRESSINGS.

Dressings are meant for the following functions:

1.) To reduce / prevent infections
2.) To offer protection to healing wound
3.) To offer mechanical support to tissues

classification:

A.) Fibres

a.) Non-Medicated fibres:

Absorbent cotton, wool, rayon, silk

b.) Medicated fibres:

Boric acid wool, capsicum wool

B.) Fabric

These are woven materials.

These may be medicated/ non-medicated

Eg: Absorbent lint.
Absorbent Ribbon gauze
Boric acid lint
Absorbent gauze

C.) Bandages:

These are the products used to retain dressings in place & provide support for applications of medication to the skin.

They are water-proof, ② types

a.) Non-Medicated Bandages:

Crepe bandage, cotton & Rubber elastic bandage

b.) Medicated Bandages:

Plaster of Paris Bandage, Zinc paste bandage

Sutures

These are the sterile threads, strings/ strands specially prepared for use in surgery meant for sewing tissues together.

Sutures must possess the following properties:

1.) They must be sterile & should cause no irritation.

2.) They should have finest possible guage & adequate strength

3) If absorbable, their time of absorption must be known

4.) They are intended to be used for one occasion only.

1.) **Absorbable sutures:**
   a.) Sterile catgut
   b.) Sterile reconstituted collagen suture

2.) **Non-absorbable sutures:**
   a.) Sterile non-absorbable sutures
   b.) Sterile linen suture
   c.) Sterile stainless & silver sutures

3) **Haemostatitics:** a.) Oxidised cellulose
   b.) Absorbable gelatin sponge

Unit - 10 & 11 Carbohydrates & Derived Products

Carbohydrates are defined as Polyhydroxy aldehydes / Polyhydroxy ketones / compounds that on hydrolysis produce any aldehydes / ketones

Carbs

SACCHARIDES (Simple sugars) | POLYSACCHARIDES

- Low molecular weight carbohydrates are crystalline, soluble in water & sweet in taste

Eg: GLUCOSE, FRUCTOSE & SUCROSE

- The high molecular weight carbohydrates (polymers) are amorphous, tasteless & relatively less soluble in water

Eg: starch, cellulose, gums, pectin, inulin

Depending upon chemical structure, saccharides are subdivided as

Monosaccharides
Disaccharides
Trisaccharides

A.) Monosaccharides:

Monosaccharides are sugars, which cannot be further hydrolysed to simple sugars.

They are classified according to the number of carbon atoms in sugar molecules.

1.) BIOSES: They contain (2) carbon atoms. They do not occur free in nature.

2.) TRIOSES: They contain (3) carbon atoms, but in form of phosphoric esters, Eg: Glyceraldehyde

3.) TETROSES: They contain (4) carbon atoms, Eg: Eaythrose

4.) PENTOSES: They are very common in plants & are products of hydrolysis of polysaccharides like hemicellulose mucilage & gums Eg: Arabinose, ribose & xylose.

5.) HEXOSES: They are monosaccharides containing (6) carbon atoms & are abundantly available carbs of plant kingdom.

eg: Starch, inulin.

6.) HEPTOSES: They contain (7) carbon atoms, vitally imp. in the photosynthesis of plant & Glucose metabolism of animals & rarely in plants

Eg: Glucoheptose & mannoheptose

B.) Disaccharides:

Carbs, upon hydrolysis yields (2) molecules of monosaccharides are called as disaccharides

Sucrose $\xrightarrow{\text{Hydrolysis}}$ Glucose + fructose (Sugarcane)

Maltose $\xrightarrow{\text{Hydrolysis}}$ Glucose + Glucose (malt sugar)

Lactose $\xrightarrow{\text{Hydrolysis}}$ Glucose + Galactose (Cow's Milk)

C.) Trisaccharides:

These liberate (3) molecules of monosaccharides on hydrolysis.

Raffinose $\xrightarrow{\text{Hydrolysis}}$ Glucose + Fructose + Galactose (in beet & manna)

D) Tetrasaccharides:

Stachyose, a tetrasaccharide, yields on hydrolysis, four molecules of monosaccharide.

Chemical tests for carbohydrates

1) Molisch's test:

The test is +ve with both soluble & insoluble carbohydrates.

It consists treating the compounds with α-napthol & conc. H_2SO_4 which gives purple colour.

2) Fehling's test: To soln of carbs equal quantity of Fehling's solutions A & B is added.

After heating, brick red ppt is obtained.

1) Indian Gum:

Syn: Gum acacia, Gum arabic

B.S: Indian Gum is dried gummy exudation obtained from the stem & branches of Acacia arabica belonging to the family leguminosae

Method of Prep:

It is a Gum which is collected from wild grown plants, made free of bark & foreign org. matter, dried in sun, which also results in partial bleaching of gum.

Morphological characters:

Colour: Tears are cream-brown to red in colour & powder is light brown in colour

Odour: odourless

Taste: Bland & Mucilaginous

Solubility: Soluble in water, the watery solution is viscous & acidic It is insoluble in alcohol.

Chem. Const:

It consists principally of arabin, which is a complex mixture of Ca, Mg, K salts of arabic acid.

Arabic acid on hydrolysis gives

L-arabinose, L-rhamnose, D-galactose & glucuronic acid.
It also contains an Enzyme Oxidase & peroxidase.

Chem. Test:

1.) Soln of lead subacetate gelatinises the aqueous soln of Indian gum.
2.) It does not produce a pink colour with soln of ruthenium red.

Uses:

1.) Acacia is a demulcent
2.) In the form of mucilage, it is used as a suspending agent specially in resinous substance.
3.) Acacia is a good emulsifying agent for fixed oils, Volatile oils & also for liquid paraffin.
4.) It is used as a good binding agent & is used in preparation of lozenges, pastilles & compressed tablets.

(2.) GUAR GUM:

Syn: Guar flour, Jaguar gum.

B.S: Guar gum is the powder of endosperm of the seeds of Cyamopsis tetragonolobus belonging to the family leguminosae

Method of Prep:

1.) Guar gum is industrially manufactured from the white, well-developed seeds that are freed from foreign matter.
2.) The seeds are put into grinder to get bifurcated guar seeds
3.) Cotyledons are seperated from endosperm by winnowing & sifting fetch very high price in market as cattle feed
4.) The endosperms i.e crude guar gum, is pulverised by means of micro-pulverizer & grinding for 15 min.
5.) The crude guar gum is now free of cotyledons, the main impurity of the gum.
6.) The crude guar gum thus separated is put into pulverizer & grinding is

continued for 3 to 4 hours followed by sifting.

7.) This process is repeated about 5 to 6 times for several hours to give white coloured guar gum.

8.) Finally, it is sifted through sieves of 40 - 60 mesh to give granular & powdered gum.

Morphological characters:

Colour: Colourless / Pale Yellowish white

Odour: Characteristic odour

Taste: Gummy taste

Solubility: Guar gum swells rapidly in water with a translucent suspension.

Chem. Constituents:

The contents are divided into water-soluble & water insoluble parts. Water soluble fraction constituting about 85% of gum known as GUARAN.

Guaran $\xrightarrow{\text{hydrolysis}}$ 65% galactose + 35% of mannose

Guar Gum also contains → 5-7% of proteins

Chem test:

1.) It does not acquire Olive green colour with weak solution of iodine

2.) with soln with ruthenium red, the gummy soln does not acquire pink colour

3.) with about 2% lead acetate soln gives ppt with soln of guar gum

Uses:

1.) About 1% mucilage of guar gum posses similar viscosity to that of mucilage of acacia & tragacanth

2.) It has 5-8 times thickening power than starch.

3.) It is a protective colloid, a binding & disintegrating agent, bulk laxative, appetite depressant.

4.) Guar Gum is a good emulsifying agent

5.) Industrially, this is used in manufacturing, printing, polishing, textiles & in food & Cosmetic industries

(3.) Honey:

Syn: Madhu, Mel

B.S: Honey is a sugar secretion deposited in honey comb by the bees, Apis mellifera, belonging to the family Apidae

Method of Preparation:

1.) The nectar of flowers is a watery solution containing 25% sucrose & 75% water.

2.) The worker bees sucks this nectar through its hollow tube of mouth (proboscis) & deposits in honey sac located in abdomen.

3.) The enzyme invertase present in saliva of the bee converts nectar into invert sugar.

4.) Honey comb is smoked to remove the bees & honey is obtained by applying pressure to it & allowing it to drain naturally.

5.) The honey of commerce is heated to 80°C & allowed to stand.

6.) Honey is extracted from comb by centrifugation

7.) It must be free from foreign substances

8.) Honey is liable to fermentation, unless it is suitably processed.

9.) It should be cooled rapidly or else it darkens in colour on keeping.

Morphological characters:

Colour: Pale Yellow to Yellowish brown

Odour: Characteristic, pleasant

Taste: Sweet & faintly acid.

Solubility: It is soluble in water & insoluble in alcohol

Chem. Const:

Honey is an aqueous solution of glucose 35%; fructose (45%), sucrose (2%).

The other const are maltose, gum, traces of succinic acid, acetic acid, dextrin, formic acid, colouring matters, enzymes (invertase, diastase, inulase) & traces of vitamins.

Proteins & Pollen grains from various flowers are found in honey.

Chem. Test:

Test for Reducing sugar is +ve

Uses:

1.) Honey is used as a demulcent & sweetening agent.
2.) A good nutrient to infants & patients.
3.) It is an antiseptic & applied to burns & wounds.
4.) It is a common ingredient of several cough mixture, cough drops & vehicle for ~~organic~~ dermatic formulations.
5.) It is used in prep of creams lotions, soft drinks & candies also

(4.) Tragacanth:

Syn: Gum Tragacanth

B.S: It is the dried gummy exudation obtained by incision from stems & branches of Astragalus gummifer belonging to the family leguminosae

Morphological Characters:

Colour: The flakes are white / pale yellowish-white
Odour: Odourless
Taste: Mucilagenous
Solubility: partly soluble in water, in which it swells to homogeneous adhesive gelatinous mass., insoluble in alcohol

Chem. const:

Tragacanth contains (2) fractions of which one is soluble in water. The water-soluble portion is known as TRAGACANTHIN constituting about 8 - 10% of gum. water-insoluble portion is known as BASSORIN (60 - 70%)
The products of hydrolysis of tragacanth are galactouronic acid, D-galactopyranose, L-arabino-rhamnose

Chem. Tests:

1.) when soln of tragacanth is boiled with few drops of 10% aq. ferric chloride soln, deep yellow ppt is formed.
2.) when it is warmed with nitric soln, canary yellow colour is developed with strong iodine soln, it gives green colour

Uses:

1.) It is used as a demulcent & as an emollient in cosmetics.
2.) Tragacanth is used as a thickening & suspending & emulsifying agent.
3.) Mucilage of Tragacanth is used as a binding agent in tablets & also as an excipient in the pills.
4.) Tragacanth powder is used as an adhesive

(5) Gum Karaya:

Syn: Indian tragacanth, Sterculia gum

B.S: Gum karaya is a dried gummy exudation obtained from the tree Sterculia tragacantha belonging to family Sterculiaceae.

Method of Prep:

1.) By tapping the exudation of karaya can be obtained.
2.) Immediately after tapping, the exudation oozes out.
3.) It is maximum during first 24 hrs
4.) The large irregular tears which weigh in pounds are picked & sent to collecting centres.
5.) Tapping is done during March – April upto june / till the commencement of monsoon.
6.) During rainy season, the yield of gum is reduced.
7.) The plants are tapped again in september.
8.) On an average the tree can be tapped for about 5 times during its lifetime
9.) The large tears are broken into small pieces, which also enhances dusting process.
10.) The pieces of bark, sand particles, & foreign organic matter are removed.
11.) The size reduction & air floatation of loose bark ensure purification
12.) Sand particles can be removed by gravity

Morphological characters:

colour – White to brown in colour
Odour – slight acetous odour
Taste – Bland & mucilaginous.
solubility – Insoluble in water forms a translucent colloidal sol.

Chem. const:

Karaya Gum contains about 8% of acetyl group & more than 37% of uronic acid residues. On acid hydrolysis, it gives D-Galactose, L-Rhamnose, acid trisaccharide.

Chem. test:

Gum Karaya gives pink colour with solution of Ruthenium Red. (Not observed in Gum tragacanth)

Uses:

1.) It swells about 60-100 times in water, so it is neither digested nor absorbed by the body, hence it is a good bulk laxative.
2.) It is also used as denture adhesive in dental treatment & in pharmaceuticals, it is used as Emulsifier, thickener & stabiliser.
3.) It is used in large scale in foods such as ice pops, cheese spread.
4.) It is also used in paper & textile industries.

6. Chitin:

B.S: It is the polysaccharide derivative containing amino & acetyl groups & is the most abundant organic constituent in skeletal material of invertebrates. It is found in Molluscs, annelides, arthropods & as a constituent of mycelia & spores of many fungi. mycelia of Penicillium species contain about 20% of chitin.

Morphological characters:

Colour - White amorphous solid
Odour - Odourless
Taste - Tasteless
Solubility - Insoluble in water, soluble in hydrochloric acid & sulphuric acid.

Chem. test:

1.) Soak Chitosan (deacetylated chitin) in iodine solution & to it add 10% H_2SO_4, a deep-violet colour is developed.
2.) Dissolve chitosan in 50% HNO_3 & allow to crystallise the spherocrystals of chitosan nitrate is formed

Uses:

1.) Therapeutically, it is used in wound healing preparations.

2.) chitin is used as a sizing agent for rayon, cotton, wool & even for synthetic fibres.

3.) It has great adhesivity to Glass & plastics.

4.) Industrially, Chitin & chitosan are used in process of water treatment

7. Isapgol:

Syn: Isapghula, Indium Psyllium, flea seed

B.S: Isapgol consists of dried seeds of plant known as Plantago ovata belonging to family Plantaginaceae

Morphological characters:

Colour: Pinkish-Grey to brown

Odour: Odourless

Taste: Bland

Solubility: It swells upon addition of water

Chem. Const:

Isapgol seeds & husk contain mucilage which is present in Epidermis of seeds. chemically, it consists of pentosan & alboflonic acid.

The products of hydrolysis are Xylose, arabinose, galacturonic & Rhamnose. Fixed oil & proteins are other imp constituents.

Chem. Test:

1.) Swelling factor is the caiterion for purity of drug. It is determined by putting 1g of the drug in the measuring cylinder in 20ml water with occasional shaking. The volume occupied by the seeds for 24 hrs of wetting is measured. Swelling factor for seeds is 10 to 14.

2.) Being the mucilage chemically, isapgol gives pink colour with the soln. of Ruthenium red

Uses:

1.) The seeds as well as husk are used as demulcent, laxative, emollient & treatment of chronic constipation, amoebic & bacillary dysentery.

2.) Isapgol husk is preferred to seeds as husk contains more mucilage & seeds are said to be irritant as compared to husk.

3.) Mucilage of isapgol is used in preparation of tablets & also as a stabilizer in ice-cream industry

(8) Agar:

Syn: Agar-Agar, Vegetable gelatin

B.S:

It is the dried gelatinous substance obtained from Gelidium amansii belonging to the family Gelidaceae & several Red algae like Gracilaria

- Bleach
- High altitudes (3 washes of bleach)
- Boiled dil. acidified
- Strained while hot
- On cooling Jelly
- Narrow strips
- Allowed to melt during day time

Method of Prep:

1.) In Japan, the red-algae is grown on bamboos spread in ocean

2.) The collection of material is done in May & October

3.) The sea weeds are scrapped from bamboos, dried & shaken

4.) It is necessary to bleach the product to some extent & even to remove & foreign material like shells, sand etc.

5.) The entire material is then taken to the high altitudes where it is washed & bleached by exposing to sun.

6.) It is boiled for 5 to 6 hrs with large quantity of dilute acidified water.

7.) The extract is then strained while hot through the cloth & transferred to wooden troughs.

8.) On cooling, jelly is produced

9.) Narrow strips, thus formed are allowed to melt during the day time in the sun.

10.) The manufacture of agar takes place in the winter, & moisture removed by successively freezing, thawing & drying at 35°C.

Morphological characters:

Colour – Yellowish-grey / colourless
Odour – Odourless
Taste – Mucilagenous
Solubility – It is insoluble in cold water but forms a gelatinous mass after cooling hot solution. It is soluble in boiling water & insoluble in organic solvents.

Chemical constituents:

1. Agar consists of diff. polysaccharides named as Agarose & Agaropectin
2. Agarose is responsible for gel strength of agar & is composed of D-galactose & anhydro L-galactose units
3. It contains about 3.5% cellulose & 6% of Nitrogen containing substance.
4. Agaropectin is responsible for viscosity of Agar solutions.

Chemical test:

1. Boil about 1.5 gm agar with 100 ml water. Cool the solution to room temperature. It forms a stiff jelly.
2. With the solution of Ruthenium Red these particles acquire pink colour when observed under Microscope.
3. With 0.2% soln of agar in water, add solution of tannic acid, no precipitate is formed.

Uses:

1. Agar is used as an Emulsifying agent & bulk laxative.
2. It is used in preparation of jellies, confectionary items & in microbiology, it is employed in preparation of bacteriological culture medium.

(9.) Carrageenan:

Syn: Chondrus Extract, Irish Moss Extract

B.S: It is sulphated polysaccharide Extract of sea weed called Carrageen / Irish Moss, the red algae obtained from Chondrus Crispus belonging to the family: Rhodophyceae

Method of Preparation:

1.) Carrageenan is found in intercellular matrix & Cell Wall of algae & constitutes about 60–80% of dry weight.

2.) The dried sea weed is first cleaned with cold water & Mechanical devices so as to remove salt & other extraneous matter.

3.) It is further extracted with hot water containing sodium hydroxide / Calcium hydroxide & by adjusting the PH to slightly alkaline range.

4.) The extract is obtained by filtration & purity of the product is attained by precipitation with isopropyl alcohol / ethyl alcohol

Morphological characters:

Colour – White free flowing powder

Odour – Odourless

Taste – Bland & mucilagenous.

Solubility – It is a water soluble colloid & forms viscous solution in cold water & forms gel with hot water upon cooling

Uses:

1.) carrageenan is used as Emulsifying agent, stabilizing agent, gelling & viscosity builder in food products

2.) Tooth pastes, creams, lotions & other cosmetic products are prepared by using carrageenan

3.) In food industry, it is utilised in milk products, ice-creams, chocolate, puddings, jams, gels. Etc in Conc of 0.5 – 1.0%.

10. Inulin:

Syn: Hydrons inulin

B.S: It is a polysaccharide from the bulbs of Dehlia, Inula helenium belonging to the family: Compositae

Morphological characters:

Colour: hygroscopic, amorphous, white powder

Odour: Odourless

Taste: Tasteless

Solubility: It is soluble in hot water & insoluble in Organic solvents.

Chemical Constituents:

It is a polymer consisting of 35-50, 1-2 linked fructofuranose units, terminated with One Glucose molecule

Chemical test:

To the test solution add solution of α-napthol & Sulphuric acid, brownish red colour is formed. (Molisch's test)

Uses:

1.) Used as diagnostic agent
2.) In prep of culture media as fermentative identifying agent for certain bacteria.
3.) Manufacture of fructose, by using an Enzyme inulase
4.) Ingredient of diabetic bread

11. Mannitol:

Syn: Manna sugar, D-mannitol

B.S: It is a hexahydric alcohol obtained by isolation from the Manna species (Grasses – Glyceria maxima)
Sea weeds

It can also be obtained chemically by reduction of Mannose

Morphological characters:

Colour: White, crystalline, sweet powder

Odour: Odourless

Taste: Tasteless

Solubility: It is freely soluble in water & insoluble in alcohol.

Uses:

1.) As an excipient for tablets diluent for liquids, stabiliser thickener, nutritive sweetener nutrient.

2.) In the form of Injection, it is not metabolised & is eliminated by Glomerular filtration & hence used as Diagnostic aid & also as an Osmotic diuretic.

(12.) Starch:

Syn: Amylum

B.S: Starch consists of polysaccharide granules obtained from grains of Maize (Zea mays), Rice (Oryza sativa), wheat (Triticum aestivum) belonging to family Graminae or from tubers of potato Solanum tuberosum belonging to family: Solanaceae

Chem-Test:

To the starch solution add solution of α-napthol & Sulphuric acid brownish red colour is formed (Molisch's test)

Chem. Const:

~~Liquid Glucose~~ Starch mainly ~~Rice~~ contain

(2) polysaccharides

1.) Amylose — water soluble.

2.) amylopectin — water insoluble

Morphological characters:

Colour: Yellowish white to colourless

Odour: Odourless

Taste: Mucilaginous.

Solubility: Soluble in hot water, Insoluble in cold water, Organic solvents.

Uses:

1.) It is used as Thickening agent, binding agent in pharm. prep

2.) It is used as sweetening agents in beverages

3.) It is used in brewing & as thickening agents in baked goods & confectioneries

4.) Starch is used in paper manufacturing to increase the strength of paper & is also used in surface sizing of paper.

(13) Xanthum Gum:

B.S: Xanthum Gum is a polysaccharide produced by the certain species of bacteria produced by pure fermentation of Glucose using bacterium Xanthomonas compestris

Morphological characters:

Colour: cream coloured powder
Odour: Odourless
Taste: Tasteless

Solubility: Soluble in cold & hot water giving highly viscous solution

Chemical Nature:

Xanthum Gum contains of chain composed of D-Glucose, D-mannose, D-Glucuronic acid with short side chains

Uses:

1.) Xanthum Gum is a very Good Emulsifying agent, Stabilizer, thickener

2.) It is used in pharm & cosmetic Industries

3.) It is Extensively used in food Industry for dairy products, salad dressings & canned Industries.

Unit - 16

Different methods of Adulteration of crude drugs.

DEFINITION OF ADULTERATION:

"ADULTERATION" is a practise of substituting original crude drug partially / wholly with other similar looking substances, but the later is either free from / inferior in chemical & therapeutic properties.

"ADULTERATION" in simple terms, is debasement of an article.

DEFINITIONS:

1. **Adulterant:** The term adulterant as the substance, which is mixed, is free from / inferior in chemical & therapeutic property.
2. **Admixture:** An admixture is a material other than water, aggregates cementitious materials, fibres to modify its freshly mixed, hardenned properties during its mixing.
3. **Substitute:** It is a material / drug when a pharmacist substitutes a chemically different drug that belongs to same pharmacological class & to same therapeutic class

TYPES OF ADULTERANTS:

i.) **Deliberate Adulteration:**

Deliberate adulteration are normally commercial mainly with the intention of enhancement of profits.

ii.) **Accidental Adulteration:**

Are normally occuring accidental careless / by ignorance & non-harmful

Reasons of Adulterations:

a.) **Confusion in Vernacular Names:**

Same vernacular name of different species & different vernacular names of same species creates confusion & invites adulteration. In ayurveda, Parpatta refers to Fumaria parviflora

b.) Lack of knowledge about authentic source:

Nagakesar is one of the important drug in Ayurveda. The authentic source is Mesua ferrea. However, market samples are adulterated with flowers of Calophyll umino-phyllum because suppliers are unaware of it. Authentic flowers can be easily identified by presence of two-celled ovary whereas in case of superious flowers they are single-celled.

c.) Similarity in Morphology: (Anti-parkinsons)
Kavach (protein L-dopa)
Mucuna pruriensis adulterated with other similar Papilionaceae seeds having similarity in morphology Mucuna utilis & Mucuna deeringiana are popular adulterants.

d.) Lack of Authentic Parts of plant:
Hypericum perforatum is cultivated
St. John's Wort (anxiety depression)
& sold in European markets.
In India, availability of this species is very limited. Market sample is a whole plant with flowers & it is easy to identify them taxonomically

Conditions of Adulteration:

The term "ADULTERATION" / "DEBASEMENT" of an article covers a number of conditions which may be deliberate / indeliberate.

1.) Inferiority
2.) Spoilage
3.) Deterioration
4.) Admixture
5.) Sophistication
6.) Substitution

1.) Inferiority: It is a natural substandard condition.
(Eg: Where a crop is taken whose natural constituent is below the minimum standard for that particular drug)

(2.) Spoilage:

It is a substandard condition produced by microbial / other pest infestation which makes a product unfit for consumption.

(3.) Deterioration:

Is the loss in the quality / value of an article due to destruction of valuable constituents by bad treatment / aging / to the deliberate extraction of the constituents.

(4.) Admixture:

Is the addition of one article to another through accident, ignorance / carelessness

Eg: Inclusion of soil on an underground organ / the co-collection of two similar species.

(5.) Sophistication:

Is the deliberate addition of inferior material with intent to do fraud. Such materials are carefully produced and may appear at first sight to be genuine.

Eg: Powdered Ginger may be dilute with starch with addition of little colouring material to give the correct shade of Yellow colour.

(6.) Substitution:

Is the addition of an entirely different article in place of that which is required

Eg: Supply of cheap cotton seed Oil in place of olive Oil.

Methods of Drug Adulteration:

1.) Substitution with substandard Commercial varieties:

The adulteration with substances used here may resemble original crude drug by morphological chemical / therapeutic characters but are substandard in nature & hence cheaper in cost.

This is rather the most common practise of adulteration

(2.) Substitution with superficially similar inferior drugs:

These inferior drugs used may/may not have any chemical/ therapeutic value as that of original natural drug. Due to their morphological resemblence to authentic drug, they are marketed as adulterants. Belladonna leaves are substituted with Ailanthus leaves. Saffron is admixed with dried flowers of Carthamus tinctorius, scented bdellium is used for myrrh mother cloves & clove stalks are mixed with cloves, bees wax substituted with Japan wax.

- Capsicum minimum substituted with Arabian Senna & Dog Senna.
- Capsicum annuum with Indian Senna
- Gentian substituted with kutki

(3.) Substitution with artificially manufactured substances:

It has been also observed that substances artificially prepared to resemble original drug are used as substitutes. Generally, this practise is followed for much costlier drugs. Compressed chicory in place of coffee, paraffin wax made yellow coloured & substituted for bees wax properly cut & shaped basswood for nutmeg are some of the examples

(4.) Substitution with Exhausted drugs:

In this type, the same drug is admixed but is devoid of any medicinally active constituents as they are already extracted out. This practice is more common in case of volatile oil containing drugs like fennel, clove, coriander, caraway etc. Sometimes, natural characters

of exhausted drugs like colour & taste are manipulated by adding other additives then it is substituted, Eg: Exhausted gentian made bitter with aloes, artificial colouring of exhausted saffron etc.

5. Substitution with Synthetic chemicals:

Use of synthetic chemicals to enhance the natural character in case of addition of benzyl benzoate to balsam of Peru, citral to citrus oils like lemon Oil, Orange Oil.

6. Presence of vegetative matter from some plant:

The other miniature plants growing alongwith medicinal plant are mixed with drug due to their resembling colour, odour & in some cases constituents. The lower plants like moss, liver worts & epiphytes growing on bark portion are mixed with cascara / cinchona. The stem portions are mixed alongwith leaf drugs like stramonium, lobelia, senna.

7. Harmful adulterants:

Several times, the wastes from market are collected and admixed with authentic drugs. This is particularly noticed for liquids/ unorganised drugs. The examples like pieces of amber coloured glass in colophony glass in colophony, limestones in asafoetida, lead shot in opium, white oil in Coconut Oil, Cocoa butter mixed with paraffin, indicate this kind of adulteration practice. The addition of Rodent faecal

matter to cardamom seed is a very harmful adulterant.

B. Adulteration of Powders:

Besides the entire drugs, the Powdered forms are frequently found to be adulterated.

Some examples which can be cited here are dextrin in ipecacuanha, powdered liquorice, gentian admixed with powdered Olive stones, exhausted ginger powder in powdered colocynth, Ginger, red sanders wood in capsicum etc. The powdered bark is frequently found to be adulterated with brick powder.

Unit - 6

Study of Cells wall constituents & Cell inclusions:

Schleiden & Schwann coined cell theory stating that plant/animal body is ultimately made up of minute cells & concluded that the cell is structural unit of life.

Robert Hook is an English scientist in 1655 coined the term CELL to reach the small cavities in different plant tissue.

These little unit masses/ the protoplasm are foundation stones of both.

The majority of the cell is enclosed by a protective layer called as CELL WALL.

The term PROTOPLASM was used by Handsen in the Year 1880 for the mass of protoplasm

Containing nucleus.

The different components of the plant cell are revealed by Electron microscope.

Cell Wall Constituents:

There are two of the cells.

They are:

1.) Prokaryotic
2.) Eukaryotic

Prokaryotic type of cells are characterised by the absence of true nucleus, nucleolus, nuclear membrane are missing, DNA is without protein sheath & nuclear matter is in direct contact with the cytoplasm. Endoplasmic reticulum is missing in prokaryotic cells. Respiratory Enzymes & photosynthetic pigments are present. The Ribosomes are scattered in matrix. Mitosis & meiosis are not observed in the type of cells.

Eukaryotic cells possess well-marketed true-nucleus, with nuclear membrane while DNA is covered with protein sheath. Distinct nucleolus in the nucleus, while plastids & mitochondria are represented in the cytoplasm. The other important & major component of cytoplasm is Endoplasmic reticulum associated with ribosomes. In Eukaryotic cells, cell wall is made up of cellulose. Meiosis & mitosis are observed in these type of cells. All plant & animal cells belong to Eukaryotic type of cells.

Functions:

1.) Cell Wall:

1.) It offers rigid-frame work & protection to protoplast.
2.) Thick & lignified cells of the plant provide mechanical support to the organ.
3.) checks the rate of transpiration

due to cuticular sheath.

4.) Prevents the distention of protoplast by developing wall pressure. Due to various contents like cutin, lignin, wax etc. the cell wall results in permeability which is ultimately responsible for life of cell.

2.) Plasma-Membrane:

1.) Being selectively permeable controls transport of materials across it.

2.) Permits diffusion of water & fat soluble components. Fat insoluble components pass through the membrane by forming reversible compounds with membrane proteins.

3.) Endoplasmic Reticulum:

1.) Due to ribosomes it is involved in protein synthesis, also in glycogen & fat metabolism.

2.) Gives mechanical support to cytoplasm.

3.) Participate in exchange of materials by active & passive transport.

4.) Ribosomes:

Degradation & synthesis of proteins takes place in ribosomes.

5.) Golgi Complex:

1.) Condensation of lipids, carbohydrate hormones takes place in golgi bodies.

2.) Participates in formation of lysosomes.

6.) Mitochondria:

1.) Mainly responsible for transformation of chemical energy into biological energy in the form of ATP compounds.

2.) All enzymes involved in Krebs cycle are present in mitochondria. It is also responsible for transmission of hereditary characters (extra-nuclear)

7.) Plastids:
Play vital role in plant Metabolism. Chloroplasts capture solar energy & convert it in chemical Energy (photosynthesis)

8.) Nucleus:
Controls all activities of the cell. Biogenesis of ribosomal proteins take place in nucleolus only, nucleolus takes part in cell division.

9.) Chromosomes:
These play very important role in heredity, mutation & variation. Chromosomes have capacity of self-reproduction.
Golgi complex is present in all eukaryotic cells except in mammalian RBC.
Lysosomes are present in animal cells & not in plant cells.

Cell inclusions: (Ergastic substances of Plants)
The non-living substances of plant metabolism are known as ERGASTIC SUBSTANCES. They may be RESERVE FOODS, SECRETORY & EXCRETORY / END PRODUCTS Of Metabolism.

a.) Reserve foods: The materials which occur as reserve food in a cell are carbohydrates, proteins & lipids. They are present in insoluble forms. Their conversion to soluble form is covered by enzymatic processes.

b.) Excretory products: Animals are able to get rid of their excretory products in liquid/solid form. Plants being unable to do so their wastes are excreted in the form of insoluble products are

alcohol, it forms sphere-crystals.

STARCH: It is another polysaccharide mostly found in tubers, food-grains & seeds of the plant. It is found in the form like granules, concentric / eccentric. Starch gives blue colour with dilute solution of iodine.

CELLULOSE: A complex polysaccharide forming cell wall & its structural material of plants.

Mucilage in Senna, isapgol & linseed forming gummy solution in Epidermal cells is another example of polysaccharides.

ii.) PROTEINS: These are the nitrogenous substances either soluble / insoluble in water. They are of great importance in the structure & functioning of living cells. They are produced by & associated with living matter. They may be amorphous / crystalline. In maize, they are amorphous found in the form of layer as aleurone layer / crystalline as aleurone grain in castor seeds. They are converted to amino-acids by proteolytic Enzyme.

iii.) LIPIDS: These are reserves of food materials of plants. Those which are liquid at room-temp are called OILS & solids are called as FATS.

They are made up of fatty acids & Glycerine. Oils are found in Endosperm of following seeds of castor, pea-nut & sesame.

b.) Excretory Products:

1.) Alkaloids: These are the basic nitrogenous substances having marked physiological action if taken internally. They occur in plants as salt of nicotinic, quinic citric / oxalic acid. They are found in seeds, bark, leaves, roots. Alkaloids are used as

highly potent medicaments & possess curative properties. They are protective materials of plants discouraging animal / insect attacks. Alkaloids are detoxicating agents of plants & reservoirs for protein synthesis.

Eg: caffeine, quinine, morphine.

In large doses they are poisonous

2.) Glycosides: These are the condensation products of sugar & aglycon. Glycosides are secondary metabolites and are also poisonous. These are soluble in water as well as alcohol. Glycosides have got medicinal properties & hence most of them are used therapeutically.

Eg: Senna, Digitalis, bitter almond, etc.

3.) Tannins: Tannins are present in cell sap; soluble in water & alcohol. They give blue-black / green colour with iron compounds. They have several medicinal properties & hence are used as Drugs.

Eg: Nut-galls, Myrobalan

4.) Resins: They are found in abundance in the bark of the trees in the resin ducts / in rhizomes (Ginger), fruits (Capsicum) & other parts of the plants. They are insoluble in water, may be semi-solid / solid. Many times they get associated with gums / volatile oils.

5.) Latex: It is a white suspension wherein microscopically small particles / oil globules are suspended. Form: Latex is

present in latexiferous tissue characteristic to certain families like Euphorbiaceae, Caricaceae Papaveraceae etc.

Eg: Banyan, Madar, papaya poppy, ficus

6) Volatile Oils: These are the fragrant liquids found in plant. They are volatile, liquid & aromatic & are present in roots, leaves, barks / fruits. They are insoluble in water & are soluble in alcohol.

Normally Volatile Oils are carminative stimulants & Antiseptics.

Eg: Orange, lemon, coriander, Cinnamon, Ginger, Eucalyptus & Menthra.

7) Mineral Crystals: These occur in cell-wall / cell cavity. They are all insoluble in water. Common crystals are Calcium oxalate, calcium carbonate & Silica. They are found in Roots, Stems, leaves, fruits etc. Various types of crystals of Calcium oxalate are found like prisms, acicular, raphides, clusters, rosettes etc.

Unit - 8 Natural Pesticides

Natural Pesticides are the pesticides made by organisms usually for their own defense, which are derived from natural source such as plant, animal, bacteria, certain mineral, use to control pest naturally, with less effect & with no harm.

- Few examples of plant sources
  - Azadirecta indica (Neem)
  - Pyrethrum (Chrysanthemum)
  - Sabadilla
  - Derris
  - Tobacco
  - Ryania
  - Nux - Vomica
  - Citronella Oil.

1) Pyrethrum:

Syn: Insect flowers, Dalmation insect flowers

B.S: Pyrethrum flowers are expanded flowerheads of chrysanthemum cinerariaefolium, belonging to the family: Compositae.

Microscopical characters:

Colour - cream to straw coloured

Odour - characteristic, aromatic

Taste - Bitter followed by numbness

Chemical Nature:

The insecticidal principles of pyrethrum are located in the oleoresin secretion of floral parts of partially open or closed flowers. Although, pyrethrin -I & pyrethrin -II are main active constituents, it also contains other active compounds called cinerin -I, cinerin -II, Jasmoline -I & jasmoline - II.

Pyrethrum also contains pyrethrosin, Pyrethrol & sesquiterpene lactones

Uses:

1.) Pyrethrum used as insecticide & it is a contact poison.
2.) Pyrethrum Extract is mixed with other insecticides which enhance the action of pyrethrum by synergistic effect.
3.) Pyrethrum exerts a knock down effect on insects & so it is used to kill different plant insects, & also flies & mosquitoes
4.) Pyrethrum is used as a mosquito repellant.

(2.) Neem:

Syn: mangosa

B.S: It consists of all aerial parts of plant known as Azadirachta indica, family Meliaceae

Microscopical characters:

Colour — Yellow coloured Oil
Odour — specific odour
Taste — Bitter
Solubility — Soluble in ether & Chloroform

Chemical Constituents:

Diterpenes (Sugilol, Nimbiol) (Bark).
Triterpenes — β-Sitosterol, Nimbidinine (seed oil), Nimbidiol (Seed), Azadiaractin (Seed)
Flavonol glycosides — Quercetin, Myricetin, Kaempferol

Uses:

— Neem consists of chemicals which have 1.) Insect repellant, 2.) Insecticide, 3.) Anti feedant, 4.) Nematicide, 5.) Anti-microbial activity.
— Seed oil have Spermicidal activity.

(3.) Derris: Syn: Poison Vine

B.S: It is the main insecticidal constituent of Derris root Rhizome (Derris elliptica)

family Leguminaceae / Fabaceae

Morphological characters:

Colour - Dark Red Brown
Odour - Odourless / specific
Taste - Bitter

Chem. Constituents:

Rotenone (tubatoxin) is present in derris & cube roots from 2-10%, isoflavonoid derivative

⇒ Tephrosin, toxicarol, degnelin, Rotenone

⇒ Rotenone occurs colourless to Brownish crystals.

Uses:

1) Rotenone is a contact poison
2) Used in form of sprays for killing vegetable insects during harvesting times, such as leaf hopper, bean Mexican beetle, cotter pillars
3) For veterinary purpose, it is used to control cattle grubs, fleas & chicken lice.

(4.) Sabadilla:

Syn: Cevadilla, caustic barley.

B.S: These are dried ripe seeds of Schoenocaulon officinale belonging to family Liliaceae

Morphological characters:

Colour - Dark brown to black
Odour - Odourless.
Taste - bitter & Acrid

Chemical constituents:

Sabadilla contains a Number of alkaloids like cevadine

(which is also called crystalline veratrine), Veratridine, sabadine sabadilline. K first two alkaloids are more potent. The mixture of these alkaloids is called "VERATRINE".

Uses:

Powdered sabadilla is an insecticide used to kill house flies, thrips, bugs in form of spray / dust.

Unit-3 DPC Act, 1940 - Act - 1945

Definitions:

1) Drug: Ayurvedic, Siddha / Unani Drugs "includes all medicines intended for internal / external use for diagnosis, treatment, mitigation / prevention of disease / disorder in human beings / animals.

2) Cosmetics:

Any article intended to be rubbed, poured, sprinkled / sprayed on, or introduced into, or applicated to, the human body / any part there of for cleaning, beautifying, promoting attractiveness or altering the appearance.

3) Manufacture: Any process / part of a process for making, altering, finishing, packing, labelling, breaking up or treating / adopting any drugs / cosmetic with its sale & distribution.

4) Spurious Drugs:

If it is an imitation of, or is an

substitute for, another drug/ resembles another drug in a manner likely to deceive, or bears upon it or upon its label / container the name of another drug, unless it is plainly & conspicuously marked so as to reveal its true character & its lack of identity with such other drug.

5.) Misbranded Drugs:

- If it is so coloured, coated, powdered or polished that damage is concealed or if it is made to appear of better / greater therapeutic value
- If it is not labelled in a prescribed manner

6.) Adulterated Drugs:

- If it consists, in whole / in part, of any filthy, putrid / decomposed substance.
- If it has been prepared, packed or stored under insanitary conditions whereby it may have been contaminated with filth / it may be injurious to health.

7.) Patent / Proprietary Medicine:

A drug which is a remedy / prescription presented in a form ready for internal or external administration of human beings / animals and which is not included in the Edition of Indian Pharmacopoeia for time being or any other Pharmacopoeia authorized in this behalf of the Central Government.

Administration of the Act & Rules:

(I.) ADVISORY:

1.) Drug Technical Advisory Board (DTAB)
2.) Drug Consultative Committee (DCC)

(II.) ANALYTICAL:

1.) The Central Drug Laboratory (CDL)
2.) Drug Control Laboratories in the State (DCL)

(III.) EXECUTIVE:

1.) Licensing Authorities (Central & State)
2.) Drug Inspectors
3.) Custom Collector.

Drugs Technical Advisory Board (DTAB):

It is a statutory Board constituted by the Central Government under the provision of this Act to advise the Central Government & State Governments on all the technical matters related with the Act & also to set in the guidelines for types of formulations as & when asked for by the Central Government.

It is a technical advisory body represented by 1) Ex-officio
2) Nominated &
3) Elected Members.

Constitution of DTAB:

Ex-officio Members:

1) Director of General of Health Services (CHAIRMAN OF BOARD)
2) Drug Controller of India
3) President, Pharmacy Council of India
4) President, Medical Council of India
5) Director, Central Drug Laboratories, Kolkata
6) Director, Central Drug Research Institute, Lucknow

Nominated Members:

1) One person from Pharmaceutical Industry
2) Two Govt. Analyst
3) Two persons from among the persons who are in-charge of drug control Organisation in the State.

Elected Members:

1) One teacher in Pharmacy, pharmaceutical chemistry / pharmacognosy from the staff of University / affiliated college elected by the Executive Committee of PCI.
2) One teacher in medicine / therapeutics from the staff of University or affiliated college elected by Executive committee of Medical Council of India.
3) One person elected by Central Council of Indian Pharmaceutical Association.
4) One person elected by the central council of Indian Medical Association.
5) One Pharmacologist, elected by governing body of Indian council of Medical Research

Drugs Consultative Committee: (DCC)

- The Central Government may constitute an advisory committee to be called "the Drugs Consultative committee" to advise the central Government, the state Governments & Drugs Technical Advisory Board (DTAB) on any other matter tending to secure uniformity throughout India in the administration of this Act

Constitution of DCC:

- The Drugs Consultative Committee shall consist of

(1.) (2) representatives of Central Government to be nominated by that Government.

(2.) (1) Representative of each state Government to be nominated by the state Government concerned.

Central Drugs Laboratory (CDL):

The Central Drugs Laboratory is headed by the Director with its headquarters at kolkata. It is the statutory Analytical Laboratory for drugs & cosmetics under DCA whose decision with regards to analysis is final in the court of law.

CDL in the state

- Every state has a laboratory for the analysis & testing of drugs & cosmetics manufactured or sold in that particular area.
- Samples sent by Drug Inspector are analysed by such laboratories.
- Also analyzed the drugs sent by any person) purchaser on payment of necessary fee

Responsibilities / Functions of CDL)

1.) It takes up the analysis of samples of drugs & cosmetics sent by custom collectors & different courts.

2.) As directed by central Government, it advices the Central & State Governments & Union territories on the matters pertaining to the analysis of drugs & cosmetics also takes up analytical work of specific nature for samples sent by central Government & State Governments.

3.) It may take up the samples for analysis on payment of necessary fee for private parties, consumer organisation etc.

4.) It is Engaged in research for the development of newer techniques of analysis of drugs & cosmetics.

Government Analyst:

The Government Analysts are appointed by Central Government & State Government for the purpose of test / analysis of drugs & Cosmetics. They are employed in Central Drug Laboratory (CDL) & Drug Testing Laboratories of States & Union Territories.

Qualifications:

The person appointed should have no financial interest in import, manufacturing sale / distribution of drugs directly / indirectly. The person should be:

a.) A Graduate in Medicine / Science / Pharmacy / pharmaceutical chemistry with a minimum of 5 Years of experience after graduation in testing / analysis of drugs & pharmaceuticals in a laboratory under control of Government Analyst / Head of approved analytical institution.

b.) A post-Graduate in Medicine / science / Pharmacy / pharmaceutical Chemistry / Associateship Diploma of Institution of chemists, India with Analysis of drugs and Pharmaceutical as a special subject and at least 3 Years of experience (in all cases) in testing / analysis of drugs & pharmaceuticals under the control of Government Analyst / Head of approved analytical institution.

Duties of Government Analyst:

1.) To analyse the samples sent by the Inspector, Custom officer / other persons under provisions of chapter IV of the Act and prepare a detailed report of analysis in triplicate. The complete protocol of test of analysis should be given. The report should be sent in sealed cover to custom department / Drug inspector as the case may be.

2.) Forward the reports to the Government about work carried out, Research undertaken, publications, if any &

Keep the information up-to-date in drugs & pharmaceuticals.

3.) The GIA should verify the seal before taking up analysis & ensure proper custody of the sample sent for analysis.

Drug Inspectors:

The central & state Governments appoint the ~~Licensing authority~~ suitable number of Drug Inspectors who are released as public servants according to the section 21 of the Indian Penal code for specific area. These inspectors should not have any financial interest in the import, sale / manufacture of drugs / cosmetics. They are officially subordinate to the controlling authority and are charged with the responsibility of implementing the provisions of the DKC Act & Rules in the area of his/her jurisdiction. They either inspect the manufacturing premises which are licensed to manufacture drugs & cosmetics / licensed premises involved in the sale of drugs.

Qualifications:

1.) A graduate in pharmacy / pharmaceutical sciences / medicine with specialization in clinical pharmacology / microbiology from a recognised University in India.

2.) For inspecting the firms manufacturing Schedule C & C(1) drugs, the person appointed as Drug Inspector should have a minimum of 18 months experience in manufacturing or testing of Schedule C & C(1) drugs in an approved laboratory or minimum experience of 3 years in inspection of firms.

3.) For inspecting the firms manufacturing veterinary biological products, persons appointed as Drug Inspectors should be graduate in veterinary science / pharmacy / medicine / science with minimum 3 year experience in manufacturing & testing of veterinary products.

4.) For inspecting shops in any specified area the inspector should be a graduate in medicine / science / a registered medical practitioner

Powers:

1.) Inspection of Premises employed for manufacture, sale & exhibition of drugs & cosmetics & the personnel & Equiptments employed for testing and standardizing of drugs/ cosmetics

2.) Taking samples of drugs/ cosmetics that are being manufactured, sold, exhibited, ~~sold~~ stocked/ offered for sale/ distribution from any firm / from an ~~individual~~ individual who delivers / prepares to deliver such drug/ Cosmetic

3.) Examining records, registers, documents / other materials possessed by any individual or those present in manufacturing premises / firm & seizing them if they would serve as an Evidence of an offence.

4.) He can, at all reasonable times, enter any place in which an offence has been committed relating to manufacture sale / distribution of drugs / cosmetics

5.) He can order any person to produce any document, record, register relating to manufacture, sale / distribution any drug / cosmetic with respect to which an offence has been committed.

6.) He can exercise any other such powers as may be ~~more~~ required for maintaining the provisions of Act & Rules.

Duties:

Drug Inspectors are authorized to inspect the following premises which are licensed for the,

1.) MANUFACTURE OF DRUGS & COSMETICS:

a.) To inspect all the premises licensed for manufacture of drugs/ cosmetics that fall under his jurisdiction at least 2 times in a year

b.) To take samples of drugs / cosmetics that have been manufactured on the licensed premises & send them for test / analysis.

c.) To examine all the records & register that are required to be maintained under the Act & Rules to ensure that the conditions of license are being observed

d.) To initiate prosecutions in case of breach of the Act & Rules

2.) SALE OF DRUGS / COSMETICS :

a.) To inspect the premises licensed for sale of drugs / cosmetics under his jurisdiction at least 2 times in a year & satisfy himself that conditions of the licence are being fulfilled.

b.) To obtain samples of drugs which he has reason to suspect that the drug is being sold / stocked in contravention of the provisions of the Act & Rules & send them for test/ analysis.

c.) To investigate any written complaints made to him & carry out any enquiries / inspections that are required to detect the sale of such drugs that are in contravention of the Act & Rules

d.) To enter & search all the premises in which an offence is believed to have been committed and seize the stock of such drugs & cosmetics.

Ryania:

B.S: It consists of roots & stems of Ryania speciosa belonging to the family Flacourtiaceae

Chem. const:

Ryania contains alkaloids of which ryanodin is important.

Uses:

Ryania extracts are used as insecticide to control codling moths & corn borer

Nux - Vomica:

Syn: Crow fig, kuchla

B.S: It consists of dried ripe seeds of strychnos nuxvomica belonging to family loganiaceae.

Chem. Const: The principal alkaloid of Nux - Vomica is strychnine which has C.N.S stimulant activity is used as rodenticide.

Dog poison.

Citronella Oil :

B.S : It is a pale to deep Yellow volatile oil obtained by distillation from cymbopogon nardus belonging to family Graminae.

Chem. Const : It has a pleasant characteristic odour & contains Geraniol & citronellal.

Uses :
citronella oil is used as an insect repellant

(5) Tobacco:

B.S:- It consists of dried leaves of Nicotiana tobacum, belonging to the family Solanaceae

Morphological characters:

Colour: Green / Slightly brown
Odour: characteristic
Taste: Bitter

Chem. Constituents:

The tobacco consists of pyridine - piperidine type of alkaloids (0.5 to 1.5%) among the most prominent is Nicotine.
The other alkaloids are nornicotine & anabasine.

Chem test:

Aq. extract of tobacco when treated with cyanogen bromide soln it gives Orange colour.

Uses:

1.) Nicotine exerts stimulant effects on heart & nervous system.
2.) Tobacco & Nicotine are known as insecticides
[illegible] centuries

) Nicotinoids acts as a Contact poison. It is also effective against Moths, flies, termites, larvae Etc.

4.) It has certain advantage over synthetic insecticide that is safer, easier & less toxic to warm-blooded animals

5.) Because of its volatility, it evaporates earlier & leaves no harmful residue on marketed products.

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II – PHARM. D

PD 2.3 PHARMACOGNOSY AND PHYTOPHARMACEUTICALS QUESTION BANK

Chapter 1: Introduction

1.Define Pharmacognosy.
2. Who is the father of Pharmacognosy. How does Pharmacology been derived from Latin term.
3. Who is Sushrutha.

Chapter 2: Definition, History and Scope of Pharmacognosy

Short Answers: 2 Marks

1. Define Pharmacognosy. Who coined the term Pharmacognosy?
2. Explain the scope of Pharmacognosy.
3. Define Pharmacognosy and Phytopharmaceuticals.
4. Outline the status of Pharmacognosy in the area of research and industry.
5. What is Pharmacognosy. Mention the present status of Pharmacognosy.
6. Discuss the Scope of Pharmacognosy.
7. Define Pharmacognosy and Crude drug.
8. Name the natural sources of crude drugs with examples.
9. Name the traditional system of medicines.
10. Importance of Pharmacognosy.
11. Differentiate between organized and un-organized drugs with suitable examples.

Chapter 3: Classification of crude drugs

Long Essays: 10 Marks

1. Define crude drug. Discuss various methods of classification of crude drugs with suitable examples.
2. Discuss the various methods of classification of crude drugs with particular emphasis on the merits and demerits of each method.
3. Explain in detail chemical and pharmacological methods of classification of crude drugs with examples.

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4. Describe different methods of classification of crude drugs with examples. Give its advantages and disadvantages.
5. Define crude drug. Enlist different method of classifying crude drugs. Explain in detail pharmacological method of classification.
6. Describe the classification of crude drugs based on chemical constituents and pharmacological activity with examples.
7. Differentiate between taxonomy and chemotaxonomy. Describe their significances with reference to classification of crude drugs.
8. Write a note on advantages and disadvantages of various methods of classification of crude drugs.
9. Explain in detail botanical/ taxonomical and morphological classification of crude drugs with examples.
10. Explain in detail alphabetical and pharmacological classification of crude drugs with examples.
11. Explain the taxonomical and chemo-taxonomical classification of crude drugs with examples.
12. Explain in detail morphological and pharmacological classification of crude drugs with examples.
13. Explain in detail morphological and chemical classification of crude drugs with examples.

Short Essays: 5 Marks

14. Write a note on morphological classification of crude drugs with examples.
15. Write a note on differences between organized and unorganized drugs with examples.
16. Enumerate with examples chemical classification of crude drugs.
17. Explain with examples therapeutic classification of crude drugs.
18. Give the chemical classification of crude drugs with examples.
19. Explain the taxonomical and chemo- taxonomical classification of crude drugs with examples.
20. Give the pharmacological classification of crude drugs with examples

Short Answers: 2 Marks

21. Define chemotaxonomy. Give examples.
22. Give the significances of chemotaxonomy.
23. Classify the crude drugs based on alphabetical method of classification.
24. What are organized and unorganized drugs give examples.
25. Give the advantages and dis advantages of chemical classification.

Chapter 4: Cultivation, collection, processing and storage of crude drugs

Long Essays: 10 Marks

1. Mention the advantages and disadvantages of cultivation of medicinal plants with examples.
2. Define cultivation. Explain various factors affecting cultivation of medicinal plants.
3. Write a note on storage of crude drugs and their significances.
4. Explain in brief conservation of medicinal plants and its importance's.
5. Discuss in detail the various factors affecting cultivation of medicinal plants.
6. Enumerate the factors affecting cultivation of medicinal plants.
7. Write note on various methods of cultivation of medicinal plants.
8. Write a note on storage and processing of crude drugs.
9. Write an account on the method of drying, preservation and storage of crude drugs.
10. Write in detail about the general methods of cultivation and collection of medicinal Plants.

Short Essays: 5 Marks

11. Explain in brief storage of crude drugs with examples.
12. Write a note on Plant growth regulators.
13. Explain various methods of processing of crude drugs.
14. Explain in brief on method of drying, preservation and storage of crude drugs.
15. Explain in brief on various factors affecting cultivation of crude drugs.
16. Write in brief about conservation of medicinal plants and its importance's.
17. Give the merits and demerits of cultivation of medicinal plants.
18. Write a note on collection of barks and latex.
19. Explain in detail various methods of cultivation of medicinal plants.
20. Describe the vegetative method of propagation of medicinal plants.
21. Define soil fertility. Explain the importance of soil in cultivation of medicinal plants.

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26. Give the advantages and dis advantages of pharmacological classification.
27. Give the advantages and dis advantages of morphological classification.
28. Give the advantages and dis advantages of alphabetical classification.
29. Give the advantages and dis advantages of taxonomical classification.
30. Give the advantages and dis advantages of chemo taxonomical classification.

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22. Describe the various methods of pest control.

Short Answers: 2Marks

23. List out the factors affecting cultivation of medicinal plants.
24. Give the significances of storage and processing of crude drugs.
25. Write a note on edaphic factor.
26. What are auxins? Give its significance.
27. What are gibberellins? Give its significance.
28. Significance of moisture content and its control in crude drugs.
29. What is garbling?
30. What is coppicing and felling?
31. Conservation of medicinal plants.
32. What is grafting?
33. What are bio-fertilizers.
34. What is mulching.
35. List out the various methods of drying of crude drugs.

Chapter 5: Detailed method of cultivation of crude drugs

Long Essays: 10 Marks

1. Describe the method of cultivation and collection of Datura and Rauwolfia.
2. Describe the method of cultivation and collection of Cinchona and Fennel.
3. Describe the method of cultivation and collection of Cassia Cinnamon and Clove.
4. Describe the method of cultivation and collection of Nux vomica and Liquorice.
5. Describe the method of cultivation and collection of Cinchona and Clove.
6. Describe the method of cultivation and collection Rauwolfia and Cassia Cinnamon.
7. Describe the method of cultivation and collection of Datura and Fennel.
8. Describe the method of cultivation and collection of Cassia cinnamon & Nuxvomica.
9. Describe the cultivation and collection of Datura and Clove.
10. Describe the cultivation and collection of Cinchona and Fennel.

Short Essays: 5 Marks

11. Explain the method of cultivation and collection of Datura.
12. Explain the method of cultivation and collection of Rauwolfia.

13. Explain the method of cultivation and collection of Cinchona.
14. Explain the method of cultivation and collection of Fennel.
15. Explain the method of cultivation and collection of Cassia cinnamon.
16. Explain the method of cultivation and collection of Clove.
17. Explain the method of cultivation and collection of Nuxvomica.
18. Explain the method of cultivation and collection of Liquorice.
19. Explain the method of cultivation and collection of Ephedra
20. Explain the method of cultivation and collection of Quassia.

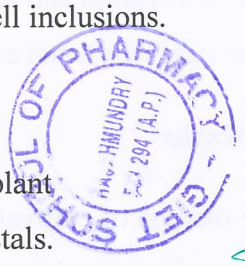
Short Answers: 2 Marks

21. Give the source, chemical constituents and uses of Datura.
22. Give the source, chemical constituents and uses of Rauwolfia.
23. Give the source, chemical constituents, and uses of Cinchona.
24. Give the source, chemical constituents and uses of Fennel.
25. Give the source, chemical constituents and uses of Cassia cinnamon.
26. Give the source, chemical constituents and uses of Clove.
27. Give the source, chemical constituents and uses of Nuxvomica.
28. Give the source, chemical constituents and uses of Liquorice.
29. Give the source, chemical constituents and uses of Ephedra.
30. Give the source, chemical constituents and uses of Quassia.

Chapter 6: Study of cell wall constituents and cell inclusions

Short Answers: 2 Marks

1. Enumerate the cell wall constituents.
2. List out different ergastic substances with examples.
3. Explain with examples non-living cell inclusions.
4. Write a note on composition of plant cell wall.
5. Explain the cell wall components and their significance.
6. Discuss the cell wall components and ergastic cell inclusions.
7. Write the chemical test for lignin and mucilage
8. Write the chemical test for starch and mucilage.
9. Name the various types of excretory products of plant.
10. Name the different types of calcium oxalate crystals.
11. Name the various types of secretory products of plant.



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12. Give the composition of cell wall.

Chapter 7: Microscopical and powder Microscopical study of crude drugs

Long Essays: 10 Marks

1. Explain with a neat labelled diagram microscopy and powder microscopical characters of Datura
2. Explain with a neat labelled diagram microscopy and powder microscopical characters of and Cassia cinnamon.
3. Explain with a neat labelled diagram microscopy and powder microscopical characters of Cinchona.
4. Explain with a neat labelled diagram microscopy and powder microscopical characters of Ephedra.
5. Explain with a neat labelled diagram microscopy and powder microscopical characters of Quassia.
6. Explain with a neat labelled diagram microscopy and powder microscopical characters of Fennel.
7. Explain with a neat labelled diagram microscopy and powder microscopical characters of Nuxvomica
8. Explain with a neat labelled diagram microscopy and powder microscopical characters of Rauwolfia.
9. Explain with a neat labelled diagram microscopy and powder microscopical characters of Liquorice.
10. Explain with a neat labelled diagram microscopy and powder microscopical characters of Clove.
11. Describe the anatomical features of Datura and Cassia Cinnamon with a neat labelled diagram.
12. Describe the anatomical features of Cinchona and Ephedra with a neat labelled diagram.
13. Describe the anatomical features of Quassia and Clove with a neat labelled diagram.
14. Describe the anatomical features of Fennel and Nuxvomica with a neat labelled diagram.
15. Describe the anatomical features of Rauwolfia and Liquorice with a neat labelled diagram.

Short Essays: 5 Marks

16. Explain with a neat diagram the anatomy of Datura.
17. Explain with a neat diagram the anatomy of Cassia Cinnamon.
18. Explain with a neat diagram the anatomy of Cinchona.

19. Explain with a neat diagram the anatomy of Ephedra.
20. Explain with a neat diagram the anatomy of Quassia.
21. Explain with a neat diagram the anatomy of Clove.
22. Explain with a neat diagram the anatomy of Fennel.
23. Explain with a neat diagram the anatomy of Nuxvomica.
24. Explain with a neat diagram the anatomy of Rauwolfia.
25. Explain with a neat diagram the anatomy of Liquorice.
26. Give the powder microscopical character for Datura and Cassia Cinnamon.
27. Give the powder microscopical character for Cinchona and Ephedra
28. Give the powder microscopical character for Quassia and Clove.
29. Give the powder microscopical character for Fennel and Nuxvomica.

Chapter 8: Study of natural pesticides

Short Essays: 5 Marks

1. Give the advantages and disadvantages of natural pesticides.
2. Write the advantages and disadvantages of natural pesticides. Explain the role of Neem as a natural pesticide.
3. Write the advantages and disadvantages of natural pesticides. Discuss Pyrethrum and Neem as natural pesticides.
4. Write the advantages and disadvantages of natural pesticides. Discuss Pyrethrum and Neem as natural pesticides.
5. Discuss various natural pesticides along with their mode of action.
6. What are natural pesticides? Give their advantages and disadvantages.
7. Write the advantages and disadvantages of natural pesticides. Discuss Pyrethrum and Neem as natural pesticides.
8. What are natural pesticides? Give their advantages and disadvantages.
9. Discuss Pyrethrum and Neem as natural pesticides.
10. Discuss Pyrethrum and Tobacco as natural pesticides.
11. Explain the mode of action of natural drugs used as pesticides.

Short Answers: 2Marks

12. Name the natural drugs used as pesticides.
13. Write the mode of action of Neem as a pesticide.
14. Write the mode of action of Pyrethrum as a pesticide.
15. Write the mode of action of Tobacco as a pesticide.
16. Give the source and chemical constituents of Neem.
17. Give the source and chemical constituents of Pyrethrum.
18. Give the source and chemical constituents of Tobacco.
19. What is pest and pesticide? Give examples.
20. What are insecticides and rodenticides? Give examples.
21. Name the various mechanisms of action of natural pesticides with examples.
22. Write the mode of action of Neem as a pesticide

30. Give the powder microscopical character for Rauwolfia and Liquorice.

Short Answers: 2 Marks

31. Give the source, constituents and uses of Datura.
32. Give the source, constituents and uses of Cassia Cinnamon.
33. Give the source, constituents and uses of Chinchona.
34. Give the source, constituents and uses of Ephedra.
35. Give the source, constituents and uses of Quassia.
36. Give the source, constituents and uses of Clove.
37. Give the source, constituents and uses of Fennel.
38. Give the source, constituents and uses of Nuxvomica.
39. Give the source, constituents and uses of Rauwolfia.
40. Give the source, constituents and uses of Liquorice.
41. Classify trichomes with examples.
42. Classify stomata with examples.
43. Give the functions of stomata and trichomes.
44. Name the shapes of bark with examples.
45. Name the drug containing plasmodesmata and give its source.
46. What is Parquetry arrangement? Give examples.
47. Give the source and uses of drug containing vittae.
48. What are cystoliths?
49. Give the powder microscopic characters of Datura
50. Give the powder microscopic characters of Cinnamon
51. Give the powder microscopic characters of Cinchona
52. Give the powder microscopic characters of Quassia
53. Give the powder microscopic characters of Fennel
54. Give the powder microscopic characters of Ephedra
55. Give the powder microscopic characters of Clove
56. Give the powder microscopic characters of Nux-vomica
57. Give the powder microscopic characters of Rauwolfia
58. Give the powder microscopic characters of Liquorice

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Chapter 9: Detailed study of various cell constituents

Short Answers: 2 Marks

1. List out the various types of plant constituents.
2. Name the different types of phytoconstituents present in plants.
3. Define carbohydrates and glycosides.
4. What are primary cell constituents? Give examples.
5. Give the general tests for the identification of carbohydrates.
6. Give the chemical tests for the identification of proteins
7. Give the chemical tests for the identification of tannins.
8. Define primary metabolites with examples.
9. Define secondary metabolites with examples.
10. List out the secondary metabolites of plants.
11. What is latex? Give examples.
12. What is lignin? Give the test for identification of lignin.
13. Give the importance's of primary and secondary metabolites.

Chapter 10: Carbohydrates and related products

Short Essays: 5 Marks

1. Define and classify carbohydrates with examples.
2. Explain the differences between gums and mucilage with examples.
3. Define carbohydrates. Give the differences between gums and mucilage.
4. What are carbohydrates? Give the general identification tests and classification of carbohydrates with examples.
5. Define and classify carbohydrates. Write the general tests for identification of carbohydrates.
6. Define simple and complex polysaccharides with examples. Give the general tests for the identification of reducing sugars.

Short Answers: 2 Marks

7. Give the identification tests for mucilage.
8. Give the source of any two drugs containing mucilage.
9. Give the source of any two drugs containing gums.
10. Define Swelling Index. Give its significances.
11. Write the general tests for identification of carbohydrates.
12. Classify carbohydrates with suitable examples.
13. What are polysaccharides? Give examples.

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14. Give the pharmaceutical significance of polysaccharides.
15. Define carbohydrates. Give some examples for disaccharides.
16. What is swelling index?

Chapter 11: Detailed study of carbohydrates containing drugs

Short Essays: 5 Marks

1. Give the source, chemical constituents and tests for Acacia.
2. Write the source, chemical constituents, method of preparation and tests for Honey.
3. Explain the source, chemical constituents and tests for Isapgol.
4. Write the source, chemical constituents, method of preparation and tests for Guar gum.
5. Write the source, chemical constituents and tests for Tragacanth.
6. Write the source, chemical constituents, method of preparation and tests for Pectin.
7. Write the source, chemical constituents and tests for Sterculia gum.
8. Write the source, method of preparation and tests for Agar.
9. Write the source, chemical constituents, method of preparation and tests for Starch.
10. Write the chemical tests used to differentiate Agar and Acacia.
11. Give the chemical tests used to differentiate Tragacanth and Acacia

Short Answers: 2 Marks

12. What is pectin? Name the source of Pectin.
13. Differentiate pure honey from adulterated honey by chemical tests.
14. Give the specific chemical tests for the identification of Tragacanth.
15. Write the chemical nature of Pectin.
16. Give the specific chemical tests for the identification chemical tests for Acacia.
17. Name the different drugs containing mucilage. How is mucilage tested?
18. Give the source of Pectin and Guar gum.
19. Chemical constituents and uses of Honey.
20. Chemical constituents and uses of Acacia.
21. Chemical constituents and uses of Tragacanth.
22. Chemical constituents and uses of Agar.
23. Chemical constituents and uses of Sterculia.
24. Chemical constituents and uses of Pectin.
25. Chemical constituents and uses of Guar gum.
26. Write the chemical tests for identification of Pectin.

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17. Define ester value and hydroxyl value.
18. Define iodine value and saponification value.
19. Give the chemistry of lipids.
20. Name the various methods of analysis of lipids.
21. List out physical methods of analysis of lipids.
22. Define Polenski value and Reichert-meisle value.
23. Define rancidity and unsaponifiable matter.

Chapter 13: Detailed study of oils

Short Essays: 5 Marks

1. Explain the source, method of production and uses of Castor oil and Linseed oil.
2. Give the source, method of preparation and uses of Cod liver oil and Chaulmoogra oil.
3. Give the source, method of preparation and uses of Olive oil and Sesame oil.
4. Discuss the source, chemistry, method of preparation and uses of Castor oil.
5. Discuss the source, chemistry, method of preparation and uses of Chaulmoogra oil.
6. Source, chemical constituents, tests and uses of Chaulmoogra oil and Linseed oil.
7. Write the source, chemical constituents, uses and identification tests for Castor oil and Cod liver oil.
8. Write the source, chemical constituents, uses of Olive oil and Linseed oil.
9. Discuss the source, chemical constituents, uses and tests for the identification of Olive oil and Sesame oil.
10. Write the source, chemical constituents, uses of Olive oil and Castor oil.

Short Answers: 2Marks

11. Give the chemical constituents and uses of Chaulmoogra oil.
12. Give the chemical constituents and uses of Castor oil.
13. Give the chemical constituents and uses of Cod liver oil.
14. Give the chemical constituents and uses of Olive oil.
15. Give the chemical constituents and uses of Linseed oil.
16. Give the chemical constituents and uses of Sesame oil.
17. Explain the method of preparation of Castor oil.
18. Explain the method of preparation of Linseed oil.
19. Explain the method of preparation of Cod liver oil.

27. Write the chemical tests for identification of Sterculia.
28. Give the source and pharmaceutical uses of Acacia
29. Give the source and pharmaceutical uses of Agar.
30. Give the source and pharmaceutical uses of Sterculia.
31. Give the source and pharmaceutical uses of Tragacanth.
32. Give the source and pharmaceutical uses of Honey.
33. Give the source and pharmaceutical uses of Pectin.
34. Give the source and pharmaceutical uses of Guar gum.

Chapter 12: Definition sources, method extraction, chemistry and method of analysis of lipids

Short Essays: 5 Marks

1. Discuss in detail about chemical methods of analysis of fixed oils.
2. Define lipids. Explain the chemistry and different methods of extraction of lipids.
3. Define and outline the principle and significance of acid value and iodine value.
4. Define and outline the principle of saponification value and ester value and give its significances.
5. Define and classify lipids with the suitable examples. Give the differences between fixed oils, fats and waxes.
6. Explain the general method of extraction and refining of lipids.
7. Describe the chemical methods of analysis of lipids.
8. Define lipids. Explain the various parameters for analysis of lipids
9. Define Iodine value. Explain principle and procedure for the determination of Iodine value
10. Define acid value. Explain principle and procedure for the determination of acid value.
11. Define saponification value. Explain principle and procedure for the determination of saponification value.

Short Answers: 2Marks

12. Define saponification value. Give its significance.
13. Define acid value. Give its significance.
14. Define iodine value. Give its significance.
15. Define ester value. Give its significance.
16. Define saponification value and ester value.

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Chapter 15: Study of plant and animal fibers used in surgical dressings and related products.

Short Essays: 5 Marks

1. Classify fibers with examples and explain in detail about Jute.
2. Describe the plant fibers used in surgical dressing.
3. Describe the source, method of preparation and uses of absorbent Cotton.
4. Describe the method of preparation of Silk and Wool.
5. Write a note on plant fibers and name two surgical dressings and their uses.
6. What are surgical dressings? Name plant fibers used in surgical dressings and add a note on cotton.
7. Define surgical dressings. Write the general properties and sources of plant fibers used as surgical dressings.
8. Define and classify fibers. Write the preparation of absorbent cotton.
9. Give the source, chemical constituents and uses of cotton. Write the preparation of absorbent cotton.
10. What are surgical dressings? Explain animal fibers used in surgical dressings.
11. Give the source, method of preparation and pharmaceutical uses of Silk and Jute.
12. Give the source, method of preparation and pharmaceutical uses of Silk and Wool

Short Answers: 2 Marks

13. Define plant and animal fibers with examples.
14. Give the chemical tests for plant fibers.
15. Give the chemical tests for animal fibers.
16. Give the chemical tests for Cotton.
17. Give the source, constituents and uses of Cotton.
18. Give the source, constituents and uses of Jute.
19. Give the source, constituents and uses of Silk
20. Give the source, constituents and uses of Hemp.
21. Give the method of preparation of Hemp.

Give the source, constituents and uses of Wool.

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20. Explain the method of preparation of Chaulmoogra oil.
21. Explain the method of preparation of Olive oil.
22. Explain the method of preparation of Sesame oil.
23. Give the source and uses of the drug containing vitamin A.
24. Give source and chemical constituents of antileprotic drug.

Chapter 14: Definition, classification, chemistry and method of analysis of proteins

Short Essays: 5 Marks

1. Define and classify proteins with examples.
2. Define proteins. Add a note on chemistry and method of analysis of proteins.
3. Write the chemistry and chemical tests for proteins.
4. Write an essay on the classification and chemistry of proteins.
5. Define and classify proteins. Discuss about method of analysis of proteins.
6. Define proteins. Write in detail about properties and method of analysis of proteins.

Short Answers: 2 Marks

7. Define proteins and give examples.
8. Give the chemical tests for protein.
9. List out different methods of analysis proteins.
10. Give the identification tests for proteins.
11. Classify proteins with examples.
12. Give the general properties of proteins.
13. Give the chemistry of proteins.
14. What are derived proteins and give examples.
15. What are conjugated proteins and give suitable examples.
16. What is gelatin and write its uses.
17. Write the pharmaceutical importance of proteins.

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Chapter 16: Different methods of adulteration of crude drugs

Long Essays: 10Marks

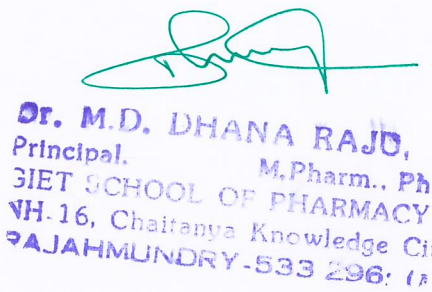
1. Explain in detail the various methods of adulteration of crude drugs with examples.
2. Explain the five different methods used for adulteration of crude drugs and discuss.
3. Define adulteration. Explain the various methods of adulteration with examples.
4. What do you mean by deliberate and indeliberate adulteration give examples?

Short Essays: 5 Marks

5. Define adulteration and explain the various methods of adulteration.
6. Define adulteration and give the reasons for adulteration with examples.
7. What do you mean by deliberate and indeliberate adulteration with examples?
8. Discuss with examples on adulteration of powder and liquid drugs.
9. Explain in detail the methods of adulteration of crude drugs with examples.
10. Name five different methods used for adulteration of crude drugs and explain with examples.
11. What is adulteration? Explain in-deliberate adulteration of crude drugs with examples.
12. What is adulteration? Explain the deliberate adulteration of crude drugs with examples.

Short Answers: 2 Marks

13. Define Adulteration and Substitution.
14. What do you mean by deliberate and indeliberate adulteration?
15. Give the various reasons of adulteration
16. Artificial adulteration with examples.
17. Name the different methods of adulteration of crude drugs.
18. Define adulteration and sophistication.
19. What are exhausted drugs? Give examples.
20. What is harmful adulteration? Give examples.
21. Give the difference between substitute and official drug with example.
22. What is substitution? Give examples.
23. What is deterioration? Give example.
24. Adulteration of crude drugs with artificial adulterants



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II/VI Pharm D I Sessional Theory Examination Jan– 2022.

PHARMACOGNOSY&PHYTOPHARMACEUTICALS

Date: 02-02-2022 **Marks: 70** **Time: 9.30 AM – 12.30 PM**

Part – A

Answer all questions. **10 x 2 = 20 M**

1. Define Pharmacognosy.
2. Who is the father of Pharmacognosy. How does Pharmacognosy been derived from Latin terms.
3. What do you mean by the term Crude Drug?
4. List few examples of Bio-Fertilizers.
5. Classify the Fixed Oils.
6. Mention few crude drugs acting on Cardio-Vascular System.
7. What is the biological source of:

   (a) Rice bran oil (b) Cotton seed oil.
8. What is the detailed method of Cultivation of Indian Senna.
9. Define the terms: (a) Pest (b) Pesticides
10. Name any two Fixed oils of Animal Sources along with its biological sources.

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Part – B

Answer any five questions. **5 x 10 = 50**

11. Write the factors affecting cultivation of the crude drugs.
12. What is the detailed method of cultivation of following crude dı

    (a) Cinchona (b) Isapgol (c) Rauwolfia (d) Mentha (e) Cinnamoı
13. What are the steps involved in the processing of crude drugs?
14. Write briefly about the classification of the crude drugs.
15. Write the synonyms, biological sources, chemical constitu morphological characters, uses of following crude drugs:

    (a) Arachis oil (b) Shark Liver oil.
16. What is the Scope of Pharmacognosy? Describe the Histor Pharmacognosy.
17. Write the synonyms, biological sources, chemical constitu morphological characters, uses of following crude drugs:

    (a) Black Mustard oil (b) Poppy Seed oil.

@@@ All the Best @@@

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II/VI Pharm D II Sessional Theory Examination Apr– 2022.

PHARMACOGNOSY AND PHYTOPHARMACEUTICALS

Date: 27-04-2022 **Marks: 70** **Time: 9.30 AM – 12.30 PM**

Part – A

Answer all questions. **10 x 2 = 20 M**

1. Define the term Proteins and classify them.
2. Differentiate between Lipids and Waxes.
3. Mention the chemical tests of Carbohydrates.
4. What do you mean by Acid value?
5. Differentiate between Non- absorbable and Absorbable surgical sutures.
6. What is Saponification value?
7. Define Fibers and classify them.
8. What is the biological source of Casein and mention its types?
9. Define Waxes and classify them.
10. What do you mean by the term Sutures?

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Part – B

Answer any five questions. **5 x 10 = 50 M**

11. Define carbohydrates and mention its types of saccharides along with examples. Write in detail about
    a) Honey b) Indian Gum
12. Write about synonyms, biological sources, chemical constituents, morphological characters, method of preparation, uses of the following crude drugs:
    a) Gelatin b) Yeast
13. Mention synonyms, biological sources, chemical constituents, morphological characters, method of preparation, and uses of any two Plant fibers.
14. Explain in detail about:
    a) Neem oil b) Wheat Germ oil c) Black Mustard oil
15. What are Lipids? Classify them. Explain about:
    a) Cocoa butter b) Yellow bees wax
16. Explain in detail about following crude drugs:
    a) Gum Tragacanth b) Wool c) Cobra Venom
17. Mention the complete details of the following crude drugs:
    a)Yeast b) Evening Prime Rose oil c) Chitin

@@@All the Best@@@

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II/VIPharm DIIISessional Theory Examination Jul– 2022.

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PHARMACOGNOSY AND PHYTOPHARMACEUTICALS

Date:06-07-2022Marks:70 Time: 9.30AM – 12.30 PM

Part – A

Answer all questions. **10 x 2 = 20 M**

1. Define Pharmacognosy. Who is the father of pharmacognosy?
2. Define Drug adulteration. Write two examples of adulteration by artificially prepared substances.
3. What are the identification tests for i.) Gelatin ii.) Wool iii.) Lignin iv.) Carbohydrate.
4. Define the term Oils, Lipids. Classify the fixed oils.
5. Mention few crude drugs acting on cardio-vascular system & gastro-intestinal tract.
6. Write the pharmacognostic study of silk.
7. List few examples of Bio-fertilizers, adulteration of powders.
8. Define: a.) Acid value b.) Iodine value c.) Saponification value d.) Ester value.
9. Name any two fixed oils &fibres of animal source along with its biological sources.
10. What is the detailed method of cultivation of cinchona, poppy plant?

Part – B

Answer anyfive questions. **5 x 10 = 50 M**

11. Define crude drug. Write briefly about the classification of crude drugs.
12. Write the factors affecting cultivation of crude drugs. What are the advantages and disadvantages of cultivation?
13. What are the ergastic substances? Write the parts or functions of cell.
14. What are the types of drug adulteration? Mention the methods of drug adulteration.
15. Define Natural pesticides. Mention any threecontact poisoned Natural pesticides.
16. Write the pharmacognostic study of any three carbohydrate crude drugs containing mucilage.
17. Write the pharmacognostic study of a.) Jute b.) Castor oil c.) Kavach d.)Gossypol.

@@@All the Best@@@

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[PD 2.3]

II/VI Pharm.D DEGREE EXAMINATION.

Second Year

PHARMACOGNOSY AND
PHYTOPHARMACEUTICALS

(W.e.f. 2008-09 A.B)

Time : Three hours Maximum : 70 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Who is Sushruta?

2. Write advantages of herbs sourced from farming and cultivation.

3. What are microscopic characters?

4. Write applications of chemical classification of crude drugs.

5. Classify lipids with examples.

6. Write significance of stomatal index in crude drug evaluation.

7. Write source and uses of Cod Liver Oil.

8. Write identification tests used for proteins.

9. Write chemical constituents of bees wax.

10. Write chemical tests for identification of starch.

SECTION B — (5 × 10 = 50 marks)

Answer any FIVE questions.

11. Write in detail on storage of crude drugs.

12. Explain the following :

(a) Lycopodium spore method

(b) Peroxide value.

13. Write in detail on methods used for extraction of lipids.

14. (a) Write a note on factors affecting cultivation of crude drugs.

(b) Write in brief on macroscopic characters used for study of crude drugs.

15. Give reasons for the following : (3 + 3 + 4)

(a) Biopesticides are better than synthetic pesticides.

(b) Secondary metabolite production alters with temperature.

(c) Saponification value helps in evaluation of purity in fixed oils.

16. (a) Write a note on types of soils used for cultivation.

(b) With a neat sketch explain the significance of trichomes in crude drug study.

17. (a) Write a note on gelatin.

(b) Discuss the source, chemistry and uses of Arachis oil.

18. (a) Write in brief on different types of adulteration.

(b) Write in brief on silk.
