DEPARTMENT OF BOTANY				*CLASS: II B.Sc/B.Com*				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
III	NME- I	20U3BNM1	Herbal Botany	2	2	25	75	100

Nature of Course				
Knowledge and skill	✓		Employability oriented	✓
Skill oriented	✓		Entrepreneurship oriented	

Course Objectives: This course will enable the students

1. To provide the knowledge on diversity and importance of indigenous medicinal plants and their role in traditional medicinal systems.
2. To enrich the knowledge on identification, medicinal properties and their mechanism of action of locally available medicinal plants.
3. To analyze the chemical principles and their drug values, conservation and utilization of endangered medicinal plants.

UNIT	CONTENT	CLO	K LEVEL	HOURS
I	**Herbal medicines**: History and scope – Diversity of Indian Medicinal Plants - role of medicinal plants in traditional systems of medicines; Demands of Indian Medicinal herbs for drug industries and exports.	**1**	**Up to K2**	**6**
II	**Pharmacognosy**: Systematic position, morphology, chemical principles, medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Gooseberry and Black pepper.	**2**	**Up to K2**	**6**
III	**Phytochemistry**: Active principles and methods of their testing - identification and utilization of the medicinal herbs; *Catharanthus roseus* (antiproliferative), *Withaniasomnifera* (nervine tonic), *Andrographis paniculata* (Hepatoprotective) and *Centella asiatica* (memory booster).	**3**	**Up to K2**	**6**
IV	**Analytical pharmacognosy**: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds).	**4**	**Up to K2**	**6**
V	**Herbal Drugs**: Conservation needs of endangered and endemic medicinal plants – *Andrographis paniculata*, *Gloriosa superba*, and *Withaniasomnifera*. Modern methods of extraction of phytodrugs – *in vitro* production of andrographolides, colchicine and withanolides.	**5**	**Up to K2**	**6**

Books for the study

1. Chopra, RN., Nayar, S.L and Chopra, I.C. (1956) Glossary of Indian medicinal plants, C.S.I.R, New Delhi.
2. Kanny, Lall, Dey and Raj Bahadur, (1984) The indigenous drugs of India, International Book - Distributors.
3. Agnes A, (1999) Herbal plants and Drugs Mangal Deep Publications. New Delhi.
4. Sivarajan, V.V. and Balachandran, I. (1994) Ayurvedic drugs and their plant source. Oxford IBH publishing Co. New Delhi.
5. Miller, Light and Miller, Bryan, (1998) Ayurveda and Aromatherapy. Banarsidass, New Delhi.

Books for References

1. Anne, G. (2000) Principles of Ayurveda, Thomsons, London.
2. Kokate, C.K.et al. (1999) Pharmacognosy, NiraliPrakashan, New Delhi.
3. Trivedi, P. C. (2006) Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
4. Sharma, R. (2004) Agro techniques of medicinal plants, Daya publishing House, New Delhi,
5 Farooqi, A.A. and Sreeramu. B.S. (2001) Cultivation of medicinal and aromatic crops, University press India.
6. Purohit, S.S., and Vyas. S.P. (2008) Medicinal plant cultivation", scientific Approach, Agrobios, India, 2006.

Web Resources

1. https://www.nhp.gov.in/introduction-and-importance-of-medicinal-plants-and-herbs_mtl
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5847565/
3. https://cb.imsc.res.in/imppat/home
4. http://www.ccras.nic.in/content/medicinal-plants
5. http://envis.frlht.org/implad

Rationale for Nature of the Course

This course will help the students to develop their knowledge on diversity and importance of indigenous medicinal plants and their role in traditional medicinal systems.

Activities having direct bearing on Skill development / Employability / Entrepreneurship

The concepts learned by the students related to medicinal properties and their mechanism of action help them to gain a position in pharmaceutical and its related industries.

Pedagogy

Chalk and Talk, PPT, Group Discussion, Seminar, Interaction, Problem Solving, Quiz, Virtual Labs & Learning Management System (CANVAS).

Course Designer: Dr. S. Karuppusamy, Assistant Professor

Course Learning Outcomes: On the successful completion of the course the students will be able to

CLOs	CLO Statement	Knowledge level
CLO-1	Understand the importance Indian medicinal plants for traditional medicines and commercial values.	**Up to K2**
CLO-2	Familiarize the knowledge on identification, properties and uses of local medicinal plants	**Up to K2**
CLO-3	Analyze the utilization and their medicinal values of common medicinal plants	**Up to K2**
CLO-4	Evaluate the scientific screening of medicinal plants for its purity of drugs and chemical principles	**Up to K2**
CLO-5	Synthesize the conservation methods of endangered medicinal plants and also modern extraction methods of Phyto drugs	**Up to K2**

Mapping Programme Specific Outcomes with Course Learning Outcomes:

	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	PSO-9
CLO-1	2	3	3	3	3	3	2	2	2
CLO-2	3	3	2	3	3	2	1	1	2
CLO-3	3	3	3	3	2	2	2	1	1
CLO-4	2	2	3	3	2	3	3	2	1
CLO-5	3	3	2	2	3	2	2	1	1

3 – Advance application; 2 – Intermediate level; 1 – Basic level

Mapping Programme Outcomes with Course Learning Outcomes:

	PO-1	PO-2	PO-3	PO-4	PO-5
CLO-1	3	3	3	3	2
CLO-2	3	3	2	3	2
CLO-3	3	3	1	-	2
CLO-4	2	1	2	1	-
CLO-5	3	3	3	2	1

3 – Advance application; 2 – Intermediate level; 1 – Basic level

Lesson Plan

Unit	Description	Hours	Mode
I	History and scope of herbal medicines	1	Discussion
	Diversity of Indian Medicinal Plants	2	Power Point
	Role of medicinal plants in traditional medicine	2	Black Board
	Values of medicinal herbs in industries and exports	1	Power Point
II	Systematic position of selected medicinal plants	1	Discussion
	Chemical principles and medicinal uses of Tulsi and Ginger	2	Power point
	Medicinal properties of Fenu Greek	1	Black Board
	Medicinal values of Indian Goose berry and Black Pepper	2	Discussion
III	Methods of testing active principles in medicinal plants	2	Black board
	Identification of medicinal plants for utilization	1	Discussion
	Discussion on *Catharanthus* and *Withania*	1	Discussion
	Discussion on *Andrographis* and *Centella*	2	Discussion
IV	Drug adulteration	1	Quiz
	Drug evaluation – Biological methods	2	Black board
	Phytochemical screening of secondary metabolites	2	Power Point
	Types of secondary metabolites in medicinal herbs	1	Discussion
V	Conservation needs of endangered medicinal plants	1	Discussion
	Modern extraction of medicinal drugs	1	Black Board
	In vitro production of Andrographolides and colchicines	2	Power Point
	In vitro extraction of Withanolides.	2	Assignment
Total		**30**	

Blue Print – Model for Internal Examination
Articulation Mapping – K Levels with Courses Leaning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section – A Short Answer		Section B (Either/ Choice)	Section C (Open Choice)	Total
			No. of Questions	K - Level			
1	CLO x	Up to K 2	2	K1& K1	2(K2&K2)	1 (K1)	
2	CLO y	Up to K 2	1	K1	2(K2&K2)	2 (K1& K1)	
No. of Question to be asked			3		4	3	14
No. of Question to be answered			2		2	2	10
Mark for each question			2		7	10	
Total Marks for each section			6		14	20	40

K1 - Remembering and recalling facts with specific answers
K2- Basic understanding of fact and stating main ideas with general answers

Distribution of Section- wise Marks with K Levels

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	**Total Marks**	% of Marks without choice	**Consolidated**
K1	10	-	30	**40**	66.67	**100**
K2	-	20	-	**20**	33.33	
Total Marks	10	20	30	**60**	100.00	**100%**

Blue Print – Model for External Examination

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section – A		Section B (Either/ Choice)	Section C (Open Choice)
			Short Answer			
			No. of Questions	K – Level		
1	CLO 1	Up to K 2	1	K1	2(K2&K2)	1 (K1)
2	CLO 2	Up to K 2	1	K1	2(K2&K2)	1 (K1)
3	CLO 3	Up to K 2	1	K1	2(K2&K2)	1 (K1)
4	CLO 4	Up to K 2	1	K1	2(K2&K2)	1 (K1)
5	CLO 5	Up to K 2	1	K1	2(K2&K2)	1 (K1)
No. of Question to be asked			5		10	5
No. of Question to be answered			5		5	3
Mark for each question			2		7	10
Total Marks for each section			10		35	30

K1 - Remembering and recalling facts with specific answers
K2- Basic understanding of fact and stating main ideas with general answers

Distribution of Section- wise marks with K Levels

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	**Total Marks**	% of Marks without choice	**Consolidated**
K1	20	-	50	**70**	58.33	**100**
K2	-	50	-	**50**	41.67	
Total Marks	20	50	50	**120**	100.00	**100%**