



॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
'ज्ञानतीर्थ', विष्णुपुरी, नांदेड - ४३१ ६०६ (महाराष्ट्र राज्य) भारत
SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA
Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accertified with 'B++' grade

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विद्यापीठ अनुदान आयोगाने शैक्षणिक वर्ष २०२०-२१ पासून मान्यता दिलेल्या बी. व्होक (व्होकेशनल कोर्सेसचे) पदवी तृतीय वर्षाचे अभ्यासक्रमाचे (Syllabus) शैक्षणिक वर्ष २०२२-२३ पासून लागू करणे बाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, विज्ञान व तंत्रज्ञान विद्याशाखेतील विद्यापीठ अनुदान आयोगाने शैक्षणिक वर्ष २०२०-२१ पासून मान्यता दिलेल्या बी. व्होक (व्होकेशनल कोर्सेसचे) पदवी अभ्यासक्रमाचे तृतीय वर्षाचे Syllabus शैक्षणिक वर्ष २०२२-२३ पासून लागू करण्यास मा. कुलगुरू महोदयांनी मा. विद्यापरिपदेच्या मान्यतेच्या अधीन राहून मान्यता दिलेली आहे. त्यानुसार खालील अभ्यासक्रम लागू करण्यात येत आहेत.

1. B. Voc Software Development III year
2. B. Voc. Bachelor of Medical Laboratory Technology. III year
3. B. Voc. Herbal Medicine III year
4. B. Voc. Agriculture/commercial Aquaculture III year
5. B. Voc. Horticulture and Post Harvest Technology III year
6. B. Voc. Food Processing /Food Processing Technology III year
7. B. Voc. Chemical & Petrochemical Applied Analytical Chemistry III year
8. B. Voc. Life Science/Skill Based Zoology III year

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या www.srtmun.ac.in या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी. ही विनंती.

जा.क्र.:शैक्षणिक-१/परिपत्रक/व्होकेशनल अभ्यासक्रम/N-

२०२२-२३/६२५

दिनांक : २९.०९.२०२२

प्रत माहिती व पुढील कार्यवाहीस्तव :

- १) मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
- २) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- ३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
- ४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
- ५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
- ६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, सदरील परिपत्रक विद्यापीठाच्या संकेतस्थळावर प्रसिध्द करण्यात यावे.

(Signature)

सहाकुलसचिव

शैक्षणिक (१-अभ्यासमंडळ) विभाग

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
NANDED**

(NAAC Re-accredited with 'A' Grade)



UGC Sanctioned Vocational Course

Syllabus for,

Certificate, Diploma, Advanced Diploma and B. Voc. Degree in

HERBAL MEDICINE

(CBCS Pattern)

**THIRD YEAR
(Semester V & VI)**

FACULTY OF SCIENCE AND TECHNOLOGY

w.e.f.-2022-2023

Introduction:

Skills and knowledge are the driving forces of economic growth and social development for any country. Presently, the country faces a demand - supply mismatch, as the economy needs more 'skilled' workforce than that is available. In the higher education sphere, knowledge and skills are required for diverse forms of employment in the sector of education, health care manufacturing and other services. Potentially, the target group for skill development comprises all those in the labour force, including those entering the labour market for the first time, those employed in the organized sector and also those working in the unorganized sector.

Government of India, taking note of the requirement for skill development among students launched National Vocational Education Qualification Framework (NVEQF) which was later on assimilated into National Skills Qualifications Framework (NSQF). Various Sector Skill Councils (SSCs) are developing Qualification Packs (QPs), National Occupational Standards (NOSs) and assessment mechanisms in their respective domains, in alignment with the needs of the industry.

In view of this, the UGC implemented the scheme of Community Colleges from 2013-14 in pilot mode on the initiative of the MHRD. Thereafter, realizing the importance and the necessity for developing skills among students, and creating work ready manpower on large scale, the Commission decided to implement the scheme of Community Colleges as one of its independent schemes from the year 2014-15. The Commission also launched another scheme of B.Voc. Degree programme to expand the scope of vocational education and also to provide vertical mobility to the students admitted into Community Colleges for Diploma programmes to a degree programme in the Universities and Colleges. While these two schemes were being implemented, it was also realized that there is a need to give further push to vocational education on a even larger scale. Accordingly, 'Deen Dayal Upadhyay Centres for Knowledge Acquisition and Upgradation of Skilled Human Abilities and Livelihood (KAUSHAL)' was also incorporated. Since all these three provisions serve a common purpose, all these schemes are merged into a single scheme for providing skill based education under National Qualification Framework.

Swami Ramanand Teerth Marathwada University has several initiatives towards academic excellence, quality improvement and administrative reforms. In view of this priority and in keeping with Vision and Mission, process was already initiated towards introduction of semester system, grading system and credit system. University had implemented Choice Based Credit System (CBCS) pattern at UG level from the academic year 2016-2017 progressively.

Revision and updating of the curriculum is the continuous process to provide an updated education to the students at large. In view of this priority and in-keeping with Vision and Mission, process of revision and updating the curriculum is initiated and implemented at UG level from the academic year 2019-2020 progressively. Presently there is wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states. The CBCS provides choice for students to select from the prescribed courses. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our university has already introduced the choice based credit system. The semester system accelerates the teaching-learning process and enables vertical and horizontal mobility in learning.

Type of Courses and Awards:

There will be full time credit-based modular programmes, wherein banking of credits for skill and general education components shall be permitted so as to enable multiple exit and entry. The multiple entry and exit enables the learner to seek employment after any level of Award and join back as and when feasible to upgrade qualifications / skill competencies either to move higher in the job profile or in the higher educational system. This will also provide the learner an opportunity for vertical mobility to second year of B.Voc. degree programme after one year diploma and to third year of B.Voc degree programme after a two year advanced diploma. The students may further move to Masters and Research degree programmes mapped at NSQF Level 8 – 10.

Aims and Objectives:

The aims and objectives of the scheme of Vocational programme under NSQF are;

- (i) To provide judicious mix of skills relating to a profession and appropriate content of general education.
- (ii) To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
- (iii) To provide flexibility to students by means of pre-defined entry and multiple exit points.

- (iv) To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements.
- (v) Such diploma graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- (vi) To provide vertical mobility to students coming out of 10+2 with vocational subjects and Community Colleges.

Table: Indicating Eligibility, Duration, Total Credits.

Exit Points /Awards	Eligibility	Normal Duration	Skill Component Credits	General Education Credits	Total Credits for Award	NSQF Level	Medium of instruction
B. Voc. Degree	12th pass or Diploma in relevant field after 10 th	Six semester	108	72	180	7	English
Advanced Diploma		Four semester	72	48	120	6	
Diploma		Two semester	36	24	60	5	
Certificate		One semester	18	12	30	4	

OBJECTIVES OF THE COURSE

1. To provide an updated education to the students at large in order to know the importance and scope of the discipline and to provide mobility to students from one university or state to other.
2. To update curriculum by introducing recent advances in the subject and enable the students for current opportunities.
3. To provide knowledge of Herbal medicine as the basic objective of Education
4. To develop a scientific attitude to make students open minded, critical and curious
5. To develop an ability to work on their own and to make them fit for the society
6. To expose the students to contribute in different pharmaceutical industries and research institutes.
7. To develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of herbal products and their utilization.
8. To make aware of natural resources and herbal remedies and its importance.
9. To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self-reliant and self-sufficient.

OUTCOME OF THE COURSE

1. This program will help to the students about the importance and need of Herbal medicine.
2. This program will help the students for their career development.
3. This program shall train and orient the students for Herbal medicine skills and serve as human resource for the industries, pharmaceutical sector and other organizations.
4. The programme also has a strong interdisciplinary component. Emphasis is given on the experimental learning through hands-on laboratory exercises, field trips and assignments.
5. This skill oriented course will provide job opportunities.

Swami Ramanand Teerth Marathwada University, Nanded
Syllabus structure for
B.Voc. Degree in Herbal Medicine (Third Year)

Sem. V	Course Number	Course Title	Hr/Week	Type of Course	Credits	Marks		Total
						ESA	CIA	
	General Education Component							
	BAAGE -137	Marketing Skill management.	4	GE	4	75	25	100
	BAAGE -138	Climate Change and Agriculture	4	GE	4	75	25	100
	BAAGE -139	Activity based on BAAGE -137 & 138*	1	GE	1	-	25	25
	Skill Courses							
	HMED-140	Herbal Drug technology	4	CC	4	75	25	100
	HMED-141	Herbal Cosmetics	4	CC	4	75	25	100
	HMED-142	Phytochemistry	4	CC	4	75	25	100
	Practical Skill Courses							
	HMED-143	Practical based on HMED-140	3	PR	3	50	25	75
HMED-144	Practical based on HMED-141	3	PR	3	50	25	75	
HMED-145	Practical based on HMED-142	3	PR	3	50	25	75	
Sem. VI	Course Number	Course Title	Hr/Week	Type of Course	Credits	Marks		Total
						ESA	CIA	
	General Education Component							
	BAAGE -146	Farm Management, Production and Resource Economics	4	GE	4	75	25	100
	BAAGE -147	Human Resource Management	4	GE	4	75	25	100
	BAAGE -148	Activity based on BAAGE -146 & 147*	1	GE	1	-	25	25
	Skill Courses							
	HMED-149	Drug standardization and regulation	4	CC	4	75	25	100
	HMED-150	Herbal drug development	4	CC	4	75	25	100
	HMED-151	Project work	4	CC	4	75	25	100
	Practical Skill Courses							
	HMED-152	Practical based on HMED-149	3	PR	3	50	25	75
	HMED-153	Practical based on HMED-150	3	PR	3	50	25	75
	HMED-154	Seminar and Viva-Voce based on project	3	PR	3	50	25	75

*Indicate that the activity should be related to general education components of that particular semester. The institute level coordinator shall

decide about the execution.

ESA: End Semester Assessment,

CIA: Continues Internal Assessment,

GE: General Education Component,

CC: Core Skill Courses,

PR: Practical Skill Courses,

CIA of 25 Marks (Theory): 15 Marks for college level internal test & 10 Marks for Assignment,

CIA of 25 Marks (Practical): 15 Marks for college level internal practical test & 10 Marks for Record Book and Field Note Book submission

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-V

HMED-137: MARKETING SKILL MANAGEMENT

Periods: 45

Credits: 04

Unit I: Marketing Mix optimization (15)

Marketing Mix optimization: Use of various techniques like multivariate regression to analyze sales and marketing time series data, Effects of various marketing tactics in order to find out the optimal mix of various marketing activities to maximize revenue and /or profitability.

Unit II: Marketing Mix Modelling (10)

Marketing Mix Modelling: Use of this technique to analyze and optimize the marketing spends.

Unit III: Price Analysis (10)

Price Analysis: Determination of the price elasticity of a product using historical price and sales data, Application of results to find out expected volume at new prices, key price points, changing price sensitivity, and competitive price matching.

Unit IV: Promotions Analysis (10)

Promotions Analysis: Analysis of promotions data to understand the sales lift and ROI from various promotional activities such as In-store displays, Newspaper & Pre-print features, coupons, In-store, Mail/ online offers, Special packs, Special events, and discounts etc.

Reference books:

1. Marketing Mix Optimization Rules by Andrew A. Mitchell, College of Business Administration Pennsylvania State University, 1975.
2. Market Response and Marketing Mix Problems: Trends and Research Opportunities, Douglas Bowman and Hubert Gatignon, New Publishers Inc.
3. Pring on Price patterns: the definitive guide to price pattern analysis and interpretation, Martin J. Pring, Mc Graw Hill Publications

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B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-V

HMED-138: CLIMATE CHANGE AND AGRICULTURE

Periods: 45

Credits: 04

Unit-I: Composition and structure of atmosphere (10)

Composition and structure of atmosphere and definition of weather and climate, aspects involved in weather and climate, atmospheric temperature, soil temperature, solar radiation, atmospheric pressure, atmospheric humidity, evaporation and transpiration, monsoons, rainfall, clouds, drought, weather disasters and their management atmospheric pollution. Basics of weather forecasting.

Unit-II: Climate change (10)

Climate change causes, Global warming-causes and remote sensing. Effect of climate change on horticulture past and future changes in greenhouse gases within the atmosphere. Sources and sinks for greenhouse gases. Atmospheric chemistry.

Unit-III: Effect on Plant and Plant Response (15)

Plants sense and respond to changes in CO₂ concentration. Measurement of short-term effects and mechanisms underlying the observed responses in C₃ and C₄ species. Plant development affected by growth in elevated CO₂. Physiology of rising CO₂ on nitrogen use and soil fertility, its implication for production. Methodology for studying effect of CO₂. Change in secondary metabolites and pest disease reaction of plants.

Unit-IV: Social responsibility and business ethics (10)

The mechanisms of ozone and UV damage and tolerance in plants. Increased temperature and plants in tropical/sub-tropical climates- effect on growing season, timing of flowering, duration of fruit development and impacts on crop yields and potential species ranges, interaction of temperature with other abiotic/biotic stress. Mitigation strategies and prospects for genetic manipulation of crops to maximize production in the future atmosphere. Modifying Rubisco, acclimation, metabolism of oxidizing radicals, and sink capacity as potential strategies.

Reference books:

- K. Srivastava and P. K. Tyagi, 2011. Practical Agricultural Meteorology. New Delhi Publishing Agency, New Delhi.
- D. Lenka, 2006. Climate, Weather and Crops in India. Kalyani Publishers, New Delhi.
- G. S.L. H. V. Prasad Rao, 2008. Agricultural Meteorology. Prentice Hall of India Pvt. Ltd., New Delhi.
- H. S. Mavi and Graeme J. Tupper, 2005. Agrometeorology- Principles and applications of climate studies in agriculture. International Book Publishing Co. Lucknow.
- H. S.Mavi, 1994. Introduction to Agrometeorology. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- H. V. Nanjappa and B. K. Ramachandrappa, 2007. Manual on Practical Agricultural Meteorology. Agrobios India. Jodhpur.
- S. R. Reddy, 1999. Principles of Agronomy. Kalyani Publishers, New Delhi.

- T. Yellamanda Reddy and G. H. Sankara Reddi, 2010. Principles of Agronomy. Kalyani Publishers, New Delhi.
 - Pattersen, S. 1958. Introductionto Meteorology. Me. Graw Hill BookCo. Inc., New York
 - Tailor, J. T. 1967. Agricultural Climatology. Pergman Press Ltd. Headington Hill Hall, Oxford, Englandd
 - Trewarthe, T. G. 1968. AnIntroductionto Climate. Me Graw Hill Book Co. Inc., New York
 - Mavi, H. S. 1985. Introductionto Agrometeorology. Oxford & IBH Publishing Co. New Delhi.
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B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-V

HMED-140: HERBAL DRUG DEVELOPEMENT

Periods: 45

Credits: 04

UNIT-I: GENERAL METHODS OF PROCESSING OF HERBS (12 periods)

Definition, sources, identification and authentication of herbs, Different methods of processing of herbs like collection, harvesting, garbling, packing and storage conditions, Methods of drying – Natural and artificial drying methods with their merits and demerits.

UNIT-II: METHODS OF PREPARATION OF EXTRACTS (11 periods)

Principles of extraction and selection of suitable extraction method, Different methods of extraction including maceration, hot continuous extraction, pilot scale extraction and supercritical fluid extraction with their merits and demerits, Purification and Recovery of Solvents.

UNIT-III: ISOLATION AND ESTIMATION OF PHYTOCONSTITUENTS

(11 periods)

Different methods (including industrial) for isolation and estimation of phytoconstituents from the following drugs,

1. Catechins from Green tea.
2. Andrographolides from *Andrographis paniculata*.
3. Alicin from *Garlic*.
4. Piperine from *Piper nigrum*.
5. Berberine from *Berberis aristata*.

UNIT-IV: HERBAL FORMULATION DEVELOPMENT (11 periods)

Selection of herbal ingredients, Different dosage forms of herbal drugs, Evaluation of different dosage forms, Stability studies of herbal formulations.

Reference Books:

1. Drug Discovery and Evaluation in Pharmacology assay: Vogel
2. Design and analysis of animal studies in pharmaceutical development, Chow, Shein, Ching.
3. Pharmacology and Toxicology-Kale S.R.
4. Fundamentals of experimental Pharmacology-Ghosh M.N.
5. Wagner -Wolf-New Natural Products and Plant Drugs with Pharmacological, Biological or Therapeutic Activity

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-V

HMED-141: HERBAL COSMETICS

Periods: 45

Credits: 04

UNIT-I: COSMETIC TECHNOLOGY-I

(12 periods)

Fundamentals of cosmetic technology, classification of cosmetics, A brief study of raw materials used for Cosmetic preparations: surfactants, humectants, cream bases, aerosol propellants, perfumes, colours.

UNIT-II: COSMETIC TECHNOLOGY-II

(11 periods)

Stability aspects of cosmetics: Shelf-life, effects of environmental factors like light, temperatures etc on product stability. Quality control tests of different cosmetic products, Packaging of Cosmetics.

UNIT-III: HAIR AND SKIN CARE PRODUCTS

(11 periods)

Hair Care Products: Hair structure, Shampoos, Conditioners, Setting lotion, Hair creams, Hair dyes. Skin Care Products: Anatomy and physiology of skin, formulation of skin cleaners, moisturizers, sunscreen products, acne products, anti ageing creams.

UNIT-IV: TYPES OF COSMETICS

(11 periods)

Coloured Cosmetics: Introduction, lip colour, nail polish and face make-up eye make-up, Dental products: Dentifrices, Oral rinses, Tooth powder, Tooth paste. Personal Hygiene Products: Shaving creams, after shave products.

Reference Books:

1. Novel Cosmetic Drug Delivery Systems, by Magdassi and Touitou.
2. Perfumes, Cosmetics and Soaps by Poucher.
3. Drug and Cosmetic Act 1940 and rules.
4. Dr. A. Patani: The Drugs and Cosmetics Act 1940, Eastern Book Company, Lucknow.
5. Cosmetic Science and Technology Vol I, II, III by Sagarin.
6. Harry's Cosmetology
7. Theory and Practice of Industrial Pharmacy by Leon Lachman.
8. Wealth of India by CSIR
9. Pharmacognosy Vol I & Vol II by Mohammed Ali
10. Herbs useful in dermatological Therapy, Behl P.N.
11. Dian Dinein Buchmans Herbal medicure , Gramercy, publication, company illustrated by Leaven Jarrett
12. Cosmetics Analysis selective methods with techniques by P. Bare.

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-V

HMED-142 : PHYTOCHEMISTRY

Periods: 45

Credits: 04

UNIT-I METHODS OF ANALYSIS OF PHYTOCHEMICALS (11 periods)

General methods for extraction, isolation of phytochemicals, methods of separation and identification of major groups of phytochemicals. Bioactivity assay for antibacterial, antifungal and antiviral activity from higher plants.

UNIT-II PLANT PHENOLICS (11 periods)

Shikimate pathway, structural chemistry and biological properties of phenols, phenolic acids, phenylpropanoides (coumarins and hydroxyl cinnamates). Flavonoids, Lignins and Tannins.

UNIT-III PLANT ALKALOIDS AND TERPENOIDS (11 periods)

Structural chemistry, classification and biological properties of major alkaloids and terpenoids from plants. Structure and properties of cyanogenic glycosides and their derivatives.

UNIT-IV ENZYMES (12 periods)

Introduction, properties, classification, extraction and purification of enzyme. Michaelis-Menten equation, Lineweaver-Burk equation. Types of enzyme inhibition. Application of enzymes in industry and medicines.

Reference Books:

1. Wagner -Wolf-New Natural Products and Plant Drugs with Pharmacological, Biological or Therapeutic Activity
2. 10. Chatwal G. Organic Chemistry of Natural Products, Vol-I and II, 7th Reprint 1998, Himalaya Publishing House, Mumbai
3. Indian Herbal Pharmacopoeia, Volume I and II-1999, a Joint publication of IDMA and RRL Jammu Tawi.
4. Trease and Evans-Pharmacognosy, 14th Edition, 1997, W. B. Saunders Company, Singapore
5. Wallis, T. E. Textbook of Pharmacognosy, 5th Edition-1997, CBS Publisher
6. Tyler, Brady, Roberts-Pharmacognosy, 8th Edition-1981, K. M. Varghese Company, Mumbai
7. Sim. S. K. Medicinal Plant Alkaloids and Glycosides, 2nd Edition-1966 University of Toronto Press, Toronto.
8. Natural products: A lab guide by Raphael Ikan , 2nd Edition, Academic Press 1991.

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-VI

**HMED-146: FARM MANAGEMENT, PRODUCTION AND RESOURCE
ECONOMICS**

Periods: 45

Credits: 04

Unit-I: Introduction to Farm Management (10)

Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product-product relationship,

Unit-II: concept of cost (15)

Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labor income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises.

Unit-III: Farm Records (10)

Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises.

Unit-IV: Risk Management (10)

Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies, Crop/livestock/machinery insurance – weather based crop insurance, features, determinants of compensation. Concepts of resource economics, unique properties of natural resources. Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Suggested Readings:

- 1) Economics of Agricultural Production and Resource Use: Heady, Earl O, Prentice Hall of India, Private Limited, New Delhi, 1964
- 2) Fundamentals of Farm Business Management: S.S. Johl, J.R. Kapur, Kalyani Publishers,
- 3) Agricultural Economics: Subba Reddy S., Raghuram P., NeelakantaSastry T.V., Bhavani Devi I., Oxford and IBH Publishing Company, Private Limited, New Delhi, 2006
- 4) Farm Management Economics: Heady Earl O and Herald R. Jenson, Prentice Hall, Delhi, 1954

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-VI

HMED-147: HUMAN RESOURCE MANAGEMENT

Periods: 45

Credits: 04

Unit-I: Introduction to HRD (15)

HRD-Macro Perspective : HRD Concept, Origin and Need, HRD as a Total System; Approaches to HRD; Human Development and HRD; HRD at Macro and Micro Climate. HRD-Micro Perspective: Areas of HRD; HRD Interventions Performance Appraisal, Potential Appraisal, Feedback and Performance Coaching, Training,

Unit-II: Instructional Technology for HRD (10)

Learning and HRD; Models and Curriculum; Principles of Learning; Group and Individual Learning; Transactional Analysis; Assessment Centre; Behaviour Modeling and Self Directed Learning; Evaluating the HRD

Unit-III: Training and Development (10)

Human Resource Training and Development: Concept and Importance; Assessing Training Needs; Designing and Evaluating T&D Programmes; Role, Responsibilities and challenges to Training Managers.

Unit-IV: Training Methods (10)

Training with in Industry (TWI): On the Job & Off the Job Training; Management Development: Lecture Method; Role Play; In-basket Exercise; Simulation; Vestibule Training; Management Games; Case Study; Programmed Instruction; Team Development; Sensitivity Training; Globalization challenges and Strategies of Training Program, Review on T&D Programmes in India.

Reference Books:

1. Nadler, Leonard : Corporat Human Resource Development, Van Nostrand Reinhold, ASTD, New York .
 2. Rao, T.V and Pareek, Udai: Designing and Managing Human Resource Systems, Oxford IBH Pub. Pvt.Ltd., New Delhi , 2005.
 3. Rao, T.V: Readings in HRD, Oxford IBH Pub. Pvt. Ltd., New Delhi , 2004. 4. Viramani, B.R and Seth, Parmila: Evaluating Management Development, Vision Books, New Delhi .
 5. Rao, T.V.(et.al): HRD in the New Economic Environment, Tata McGraw-Hill Pub.Pvt, Ltd., New Delhi , 2003.
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B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-VI

HMED-149: DRUG STANDARDIZATION AND REGULATION

Periods: 45

Credits: 04

UNIT-I: STANDARDIZATION OF HERBAL MATERIAL

(12 periods)

Standardization of herbal raw materials including Pharmacognostic, physical, chemical and biological methods with examples, Standardization of herbal extracts, physical, chemical and spectral analysis.

UNIT-II: EVALUATION OF HERBAL EXTRACTS

(11 periods)

Qualitative and Quantitative estimation of active principles from standardized extracts by HPTLC, Biological standardization - Pharmacological screening of herbal extracts and Microbiological evaluation of herbal extracts, Toxicity studies of herbal extracts.

UNIT-III: HERBAL DRUG PROCESSING PRACTICES

(11 periods)

Good Agricultural Practices, Good practices in collection of plant materials, Primary processing of herbal products. Documentation required other guidelines for Quality Assurance of Herbal drugs.

UNIT-IV: DRUG REGULATION

(11 periods)

Drug Regulatory Affairs: Role of Regulatory Affairs Dept, Nomenclature and salient features of regulatory authorities of India, US, Japan and EU, Stability testing protocols of drug products as per ICH guidelines.

Reference Books:

1. W.C. Evans, Trease and Evans Pharmacognosy, 15th edition, 2002, W.B. Saunders & Co., London.
2. V.K. Srivastava, K.Kishore, Introduction to chromatography theory & practicals, 1991, S. Chand & Co. Ltd., Delhi.
3. A.C.Mottal, Clerk's Isolation & Identification of drugs, 1967, Pharmaceutical Press, London.
4. J.B. Harbone, Phytochemical methods of chemical analysis, 1973, Chapman & Hall, London.
5. B.N.Dhavan & R.C.Srimal, The use of Pharmacological techniques for the evaluation of natural products. CDRI, Lucknow.
6. C.K. Kokate, Practical Pharmacognosy, 1988, Vallabh Prakashan, Delhi.
7. M.Williamson, David T.Okpako, J.Evans, Selection, Preparation and pharmacological evaluation of plant material.
8. R.D.Chaudhury, Herbal Drug Industry, Eastern Publishers, New Delhi.

9. H. Gerhard Vogel, Drug Discovery & Evaluation, 2nd Edn. 2002, Springer-Verlag Berlin Heidelberg New York.
10. Robert A. Turner, Screening Methods in Pharmacology, Elsevier's, London.
11. Dr. P. Mukherjee, Quality control herbal drugs, 2005, Business Horizons, New Delhi.
12. Forensic Pharmacy by B. S. Kuchekar, A. M. Khadatare and S. C. Jitkar, 6th Ed., Nirali Prakashan
13. Drugs and Cosmetics Laws by Krishnan Arora, Professional Book Publishers, New Delhi

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-VI

HMED-150 : HERBAL DRUG TECHNOLOGY

Periods: 45

Credits: 04

UNIT-I: INTRODUCTION

(12 periods)

Definition of Herbal drug, Importance of Herbal therapies, Herbal verses conventional drugs, Safety in herbal drugs. Toxicity in Herbal drugs and their interactions, General methods of extraction, isolation and purification of phyto-constituents.

UNIT-II: PHYTOCONSTITUENTS

(11 periods)

Herbs used as nutraceuticals and healing agents;. Isolation, identification tests and estimation methods for the following using advanced techniques Aloin from Aloes, Vasicine from *Adhatoda vasica*, Andrographolides from *Andrographis paniculata*, Curcumin from *Curcuma longa*, Piperine from Piper longum. Phytochemical study: isolation, estimation of alkaloids, glycosides, plant phenols, resins, terpenes and terpenoids, phospholipids and steroids.

UNIT-III: APPLICATION OF HERBAL MEDICINES

(11 periods)

Making and using herbal medicines for common ailments like cold, skin infections and Diarrhea; Analytical Profiles of selected herbs – Brahmi, *Andrographis paniculata*, *Aegle marmelos* and *Gymnema sylvestre*. Antimicrobial, anti-inflammatory and antidiabetic drugs, Screening procedures for herbal drugs with current innovations in following therapeutic classes -Antipyretic & anti-inflammatory, Antidiabetic, Anticancer Antihepatotoxic etc.

UNIT-IV: QUALITY CONTROL OF HERBAL MEDICINES

(11 periods)

Quality Control and Quality Assurance of Herbal ingredients as per W.H.O.Guidelines, Determination of tannins, Ash value and Pesticide residues. Herbal product development Lipid orals, tablets, capsules, dermatologic and herbal cosmetics, Methods involved in monoherbal and polyherbal formulations with their merits and demerits.

Reference Books:

1. Herbal Drug technology by SS Agrawal and M Paridhavi, Orient Longman
2. Herbal Drug Technology by S.S. Agrawal & M. Paridhavi
3. A.C.Mottal , Clerk's Isolation & Identification of drugs , 1967, Pharmaceutical Press, London.

4. J.B. Harbone , Phytochemical methods of chemical analysis, 1973, Chapman & Hall, London.
5. B.N.Dhavan& R.C.Srimal, The use of Pharmacological techniques for the evaluation of natural products. CDRI, Lucknow.
6. C.K. Kokate ,Practical Pharmacognosy ,1988 ,Vallabh Prakashan, Delhi.
7. M.Williamson, David T.Okpako, J.Evans, Selection, Preparation and pharmacological evaluation of plant material.

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-V

HMED-143: PRACTICAL BASED ON HMED-140

(HERBAL DRUG DEVELOPMENT)

Periods: 75

Credits: 03

1. Processing of herbs
2. Isolation and estimation of phytoconstituents by HPTLC
3. Spectroscopic analysis of some isolated compounds
4. Estimation of phytoconstituents in mono and polyherbal formulations by HPTLC technique
5. Preparation of liquid orals and capsules
6. Preparation of ointments and creams
7. Estimation of Andrographolides from *Andrographis paniculata*
8. Estimation of Alicin from Garlic
9. Estimation of Piperine from *Piper nigrum*
10. Preparation of some important extracts by using Pilot Scale Extraction from Plants

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-V

HMED-144: PRACTICAL BASED ON HMED-141

(HERBAL COSMETICS)

Periods: 75

Credits: 03

1. Preparation and evaluation of Anti dandruff Shampoo.
2. Preparation of Mouth washes
3. Preparation and evaluation of Cold Creams, Vanishing Creams.
4. Preparation and evaluation of Gels like Shaving gels
5. Preparation and evaluation of Face powder and Dusting Powder
6. Preparation and evaluation of Eye liners and Lip sticks
7. Preparation of Hand and Body Lotions
8. Preparation and evaluation of Foundation Creams and Cleansing Creams
9. Preparation of Hair oils to prevent hair fall
10. Preparation and evaluation of Aloe vera Gel
11. Preparation of Antiseptic cream (Turmeric)
12. Preparation and evaluation of Perfumes

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-V

HMED-145: PRACTICAL BASED ON HMED-142

(PHYTOCHEMISTRY)

Periods: 75

Credits: 03

1. Methods for extraction, isolation of phytochemicals
2. Methods of separation and identification of major groups of phytochemicals
3. Bioactivity assay for antibacterial, antifungal activity
4. Chemical tests for phenol
5. Chemical tests for coumarins
6. Chemical tests for flavonoids
7. Chemical tests for alkaloids
8. Chemical tests for terpenoids
9. Chemical tests for cyanogenic glycosides
10. Phytochemical screening of Natural plant products

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-VI

**HMED-152: PRACTICAL BASED ON HMED-149
(DRUG STANDARDIZATION AND REGULATION)**

Periods: 75

Credits: 03

1. Qualitative and Quantitative Microscopic Examination: Microscopic evaluation of powder drugs and their mixtures with adulterants.
2. Exercises based on standardization and quality control of plant drugs.
3. Qualitative and Quantitative Estimation of Phytoconstituents:
4. Determination of phytoconstituents in crude drugs and commercial herbal formulations.
5. Pharmacopoeial evaluation of natural products.
6. Determination of ash values, extractive values, swelling index and foaming index of crude drugs as per WHO Guidelines.
7. Preparation of detailed monograph of at least one plant drug covering Pharmacognosy and Phytochemical investigation with its use in traditional system of medicine.
8. Experiment on raw material standardization, purification of extracts with chromatographic techniques.
9. Isolation & TLC of Menthol from mentha oil.
10. Preparation and Evaluation of Herbal formulations.

B.VOC. DEGREE PROGRAMME IN HERBAL MEDICINE

B.VOC. THIRD YEAR

HERBAL MEDICINE

SEMESTER-VI

HMED-153: PRACTICAL BASED ON HMED-150

(HERBAL DRUG DEVELOPMENT)

Periods: 75

Credits: 03

1. Preparation of Ayurvedic formulation like Asava, Arista, Bhasma, Ghrita and Gutika.
2. General methods of screening of natural products for antibacterial activities
3. Determination of ascorbic acid (vitamin C) by UV spectroscopic method in various herbal Formulations
4. Determination of natural herbal products by UV Spectroscopic method
5. Isolation and estimation of phytoconstituents by HPTLC
6. Simple preparations used in Ayurvedic System and their Standardization (with special emphasis on HPTLC).
7. Impurity profiling of drugs
8. Calibration of glasswares
9. Calibration of pH meter
10. Calibration of UV-Visible spectrophotometer

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based Credit System (CBCS) (Semester Pattern)

Theory Examination

Question Paper Pattern (B.Voc.)

Maximum Marks: 75

Time: 3.00 Hrs

Q1. Long Answer Type Question(15 Marks).

OR

(a) Short Answer Type Question(8 Marks)

(b) Short Answer Type Question(7 Marks).

Q2. Long Answer Type Question(15 Marks).

OR

(a) Short Answer Type Question(8 Marks)

(b) Short Answer Type Question(7 Marks).

Q3. Long Answer Type Question(15 Marks).

OR

(a) Short Answer Type Question(8 Marks)

(b) Short Answer Type Question(7 Marks).

Q4. Long Answer Type Question(15 Marks).

OR

(a) Short Answer Type Question(8 Marks)

(b) Short Answer Type Question(7 Marks).

Q5. Write a short note on (Any three of following); (15 Marks)

(a)(5 Marks)

(b)(5 Marks)

(c)(5 Marks)

(d)(5 Marks)

(e)(5 Marks).

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based Credit System (CBCS) (Semester Pattern)

Practical Examination

Question Paper Pattern (B.Voc.)

Maximum Marks: 50

Time: 4.00 Hrs

Q1. Perform the Major Experiment(20 Marks).

Q2. (a) Perform the Minor Experiment(10 Marks).

(b) Describe procedure and working of the Minor Experiment(10 Marks).

Q3. (a) Viva -voce(5 Marks).

(b) Submission of Field Collection and Samplings during Field Visits

and Excursions.(5 Marks).
