



**VIDYASAGAR UNIVERSITY**

**Midnapore**

**National Skill Qualification Framework (NSQF)**

**A UGC sponsored Scheme**

*for*

**Certificate Course in Beekeeping and Management**

# Syllabus of the Certificate Course

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## **1. PREAMBLE**

In recent years UGC took some steps to reorient and reshape its policies regarding higher education. In addition to conventional disciplines, there is a need to introduce some carrier oriented courses where qualified students (above Higher Secondary level) may learn certain skills and knowledge which will provide them more openings in service, industry and self employment sectors. The present certificate course in 'Beekeeping and Management' was introduced for F.Y. 2018-19. Undergraduate students of Science, Commerce and Arts stream may be benefitted from this course with a view to enhance employability.

## **2. OBJECTIVES OF THE COURSE:**

1. To investigate scientifically the diversity of pollen and nectar sources for apicultural practices in natural forest ecosystems elucidating the potentiality of the available resources in honey and pollen industry in the study area.
2. To develop strategies for management of bee colonies round the year for income generation.
3. To imbibe the importance of Bee keeping and honey processing in relation with entrepreneurship development.
4. To give a better knowledge to the students about various techniques of Bee keeping and honey processing and its marketing to make them self sustainable.
5. To formulate guidelines for an appropriate technology development in honey production and utilization and preparation of a honey flora of the region by mapping honey rich forest zones.

## **3. ORDINANCE FOR CERTIFICATE COURSE IN 'Beekeeping and Management'**

The certificate course in 'Beekeeping and Management' is a Career Oriented Add-on course introduced at Under Graduate Level and will be covered under following ordinances.

- I. Maximum number of Students per batch will be 50.

- II. The admission shall be opened to any candidate who passed 10+2 examination.
- III. The candidate after passing examination will be awarded a separate certificate in ‘Beekeeping and Management’ in addition to his/her regular degree.
- IV. There will be three chances for a candidate to complete the certificate course.
- V. The candidate, who is unable to pass the course in three given chances, will not be allowed to continue the above said course.
- VI. Every candidate will be required to attend minimum of 75 % lectures/periods delivered to that class.
- VII. The candidate must obtain 35 % of the total marks in theory and practical separately to pass the course.
- VIII. Candidates will be offered English/Bengali as the medium of instructions/examination.

#### 4. FEE STRUCTURE:

Name of the Course	Tuition fee	Laboratory Fee	Library Fee	Total
Certificate Course in  ‘Beekeeping and Management’	1,500.00	400.00	100.00	2000.00

## 5. Outline of syllabus of the course with credit and workload

TITLE OF THE COURSE: 'Beekeeping and Management'

Course	unit	Topic	Credit
Paper I	I	Introductory idea about Apiculture - possibility and importance	04
	II	Honey Bee Morpho-anatomy and Life Cycle	
	III	Honey – Production, Properties and Application;	
Paper II	IV	Honeybee Plants and Floral Calendar	04
	V	Bee keeping: Tools and Equipment	
	VI	Processing of Honey and Bee Hive Products	
Paper III	VII	Bee pollination and Crop yield	04
	VIII	Diseases of Honeybees	
	IX	Bee keeping and Economics	
Total			12

## 6. Theory Syllabus for the six months Certificate Course

### ‘Beekeeping and Management’

#### Program of the Course:

1. Course will be of 30 Credits (12 theory + 28 practical). One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.
2. The candidate required to attend 75% lectures/periods.
3. The candidate must obtained 35% of the total marks in theory and practical/project work separate to pass the course.
4. Candidate will be offered English/Bengali as a medium of instructions/examination.
5. All 12<sup>th</sup> examination passed students are eligible for this course.
6. There is no age bar to participate in the course.

#### (UNIT-I to UNIT- IX)

#### Paper I

#### UNIT – I      **Introductory idea about Apiculture - possibility and importance**      (04 L)

- ❖ History of bee keeping: Definition, Bee keeping in worldwide, In India.  
Traditional bee keeping, Modern beekeeping, Urban or backyard beekeeping.
- ❖ Apiculture development in India - institutions involved. Role of Central Honey Bee Research & Training Institute.

#### UNIT – II      **Honeybee Morpho-anatomy and Life cycle**      (04 L)

- ❖ Basic concepts of morphology of Honey bees - indigenous, exotic
- ❖ Honey bee species and identification. Origin, systematic and distribution of honey bees. Types of honey bees, Species of honey bees. Bee identification.
- ❖ Social organization in honey bees: Colony life and social organization – Queen, drone, worker. Annual biological cycle of the bee colony.

**UNIT – III Honey – Production, Properties and Application**

**(04 L)**

- ❖ Production of Honey by honeybee within its stomach using plant nectar - its medicinal properties - application in various fields - other valuable by products of honey bees
- ❖ Honey - its medicinal properties - application in various fields - other valuable by products of honey bees
- ❖ Value added honey products. Properties of honey products, Nutrients and composition of honey, Acid content and flavour effects.
- ❖ Types of value added honey products.

**Paper II**

**UNIT – IV Honeybee Plants and Floral Calendar**

**(04 L)**

- ❖ Bee flora - importance propagation - congenial conditions for starting up of apiculture.
- ❖ Migratory Bee Keeping - designing floral Calendar
- ❖ Improved Agricultural practices - crop pollination - Pesticides impact on Honey bees.

**UNIT – V Bee keeping: Tools and Equipment.**

**(04 L)**

- ❖ Basic requirements of Tools for starting bee keeping: Getting Started in Beekeeping - Land and Buildings, Equipment and supplies.
- ❖ Bee keeping equipment - introduction to types of bee boxes - BIS standard Tools used in apiculture.
- ❖ Bee breeding multiplication of colonies - Queen reaching technique.

**UNIT – VI Honey Processing and Bee Hive Products**

**(04 L)**

- ❖ Honey extraction & handling - Quality control standards - Honey testing kit
- ❖ Processing of honey. Other valuable by products of honey bees
- ❖ Bee venom & Royal jelly extraction.

## Paper III

### UNIT – VII Bee pollination and Crop yield (04 L)

- ❖ Pollination: Self and cross pollination
- ❖ Bee as pollinators
- ❖ Crop improvement: Quality and yield through honeybee pollination

### UNIT – VIII Honeybee Diseases (04 L)

- ❖ Bee enemies and diseases: Introduction, Enemies of honeybees – Wax Moth, Ants, Wasps, Microbes, Pests; Diagnosis and identification.
- ❖ Bacterial, viral, fungal and protozoan diseases; Mites attacking honeybees.

### UNIT – IX Beekeeping and Economics (04 L)

- ❖ Economics in small scale and large scale bee keeping. Economic Value of Commercial Beekeeping.
- ❖ Preparing bankable bee keeping project: Steps involved in starting a beekeeping project, Funding sources for beekeeping projects.

## 7. Practical

Paper	units	Particulars	Credits
Paper IV	X	Studies in the morphology of honeybees and identification of different species of honeybees	06
	XI	Studies in the different stages of honeybee life cycle	
	XII	Beekeeping unit – Handling of frames with colonies	
Paper V	XIII	Identification of queen cells, drone cells & brood	06
	XIV	Sugar feeding of colonies during floral dearth period	
	XV	Methods of multiplication of bee colonies	
Paper VI	XVI	Steps for strengthening of colonies – Requeening technique	06
	XVII	Identification of bee flora through palynological analysis of honey samples, propagation of bee plants; preparation of floral calendar	
	XVIII	Extraction of honey using honey extractor, packing and storing of honey; Management of different hive products	



## **8. ONSITE JOB TRAINING:**

**Management of *Apis cerana* / *Apis mellifera***

**Every student will go for onsite job training considering the following Aims:**

Procurement of Equipments and Colonies, Building up of the colonies, Management of colonies during scarcity, Extraction of honey, Honey Flow management.

## **9. MODALITY OF ASSESSMENT:**

**Term End Theory Assessment –**

**There will be three theory papers of 50 marks each and three practical papers of 100 marks each.**

## **10. ANNEXURE -I**

### **Suggested Field Visits**

Field visits are to be organised to facilitate students to have first-hand experience and exposure to technology / production / functioning of an organisation / unit or witness a relevant activity. Each student must make at least 02 (Two) such visits to the units/markets/public aquarium out of 2 to 3 such visits organised by the university.

- Visit to one of the units with one or multiple activities such as, Honey bee Keeping / Honey Processing / Honey Marketing.
- Visit any production units such as, Honey Processing Unit or any Food industry

Government Offices such as

- National Bee Board (NBB), New Delhi.
- Central Bee Research and Training Institute, Khadi and Village Industries Commission, Pune.
- West Bengal Bee keepers Association, Kamarhati(NH 34), Vill – Khilkapur (N), **P.O.** Mirhati, **P.S.** Barasat North 24 Parganas, Kolkata – 700125.
- Extension Centre, Central Bee Research and Training Institute, Khadi and Village Industries Commission, Pratappur, Panskura, Purba Medinipur.

(Field visit is desirable to know the organization; however guest lecturers could also be helpful in understanding functioning).

## **11. ANNEXURE –II**

### **Suggested Topics for Entrepreneurial Skill Development**

1. Setting and Maintenance of Bee keeping unit.
2. Setting and Maintenance of Honey Processing unit.
3. Breeding and Multiplication of various bees.
4. Propagation of bee plants.
5. Preparing a proposal for starting a bee keeping and honey processing unit to a Bank or Government Authorities.

## **12. REFERENCES:**

### **Reference Books**

- ❖ Prospective in Indian Apiculture - R.C. Mishra
- ❖ Rearing queen bees in India - M.C. Suryanarayana et. al.
- ❖ Bee Keeping in India - G. K. Ghosh

- ❖ Technology and value addition of Honey - Dr. D. M. Wakhle and K. D. Kamble.
- ❖ ABC & XYZ of Bee culture - A. I. Root
- ❖ Indian Bee Journal - All India Bee Keeping Association
- ❖ Asian Bee Journal
- ❖ The Backyard Beekeeper - 3rd Edition: An Absolute Beginner's Guide to Bee Keeping - Kim Flottum
- ❖ Beekeeping: A personal journey – Dennis Brown

### **Periodicals / Papers**

- ❖ Dewey M. Caron, 2013. Honey Bee Biology and Beekeeping, Revised Edition. Wicwas Press, Kalamazoo.
- ❖ Pradip V Jabde, 1993. Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac Culture, Agricultural Pests and their Controls. Discovery Publishing House, New Delhi.
- ❖ Eva Crane, 1999. The World History of Beekeeping and Honey Hunting. Routledge, India.
- ❖ Ted Hooper, 2010. Guide to Bees & Honey: The World's Best Selling Guide to Beekeeping. Northern Bee Books, Oxford.
- ❖ Laidlaw, H.H., 1997. Contemporary queen rearing. Published by Dadant and Sons. R. A. Morse, Rearing queen honey bees. Wicwas press, NY.
- ❖ Alison Benjamin, By (author) Brian McCallum, 2008. Keeping Bees and Making Honey. David & Charles, Newton Abbot.
- ❖ Kim Pezza, 2013. Backyard Farming: Keeping Honey Bees: From Hive Management to Honey Harvesting and More. Hatherleigh Press, U.S.5
- ❖ Kim Flottum, 2014. The Backyard Beekeeper: An Absolute Beginner's Guide to Keeping Bees in Your Yard and Garden. Quarry Books.
- ❖ Roger A. Morse, Kim Flottum, 1998. Honey Bee Pests, Predators and Diseases. WicwasPr; 3rd edition.
- ❖ Alethea Morrison (Author), Mars Vilaubi (Photographer), 2013. Homegrown Honey Bees: An Absolute Beginner's Guide to Beekeeping Your First Year, from Hiving to Honey Harvest. Storey Publishing, LLC; 1 edition.

- ❖ Hunt, G.J., 2000. Using honey bees in pollination Purdue University.
- ❖ Craig Hughes, 2010. Urban Beekeeping: A Guide to Keeping Bees in the City. e Good Life Press, Preston.
- ❖ Ted Hooper, Clive De Bruyn, Margaret Thomas, 2014. The Beginner's Bee Book. Stenlake Publishing, Ayrshire.
- ❖ Layek, U and Karmakar, P. 2017. Pollen analysis of *Apis dorsata* Fabricius honeys in Bankura and Paschim Medinipur districts, West Bengal. **Grana**.
- ❖ Layek, U and Karmakar, P. 2016. Bee plants used as nectar sources by *Apis florea* Fabricius in Bankura and Paschim Medinipur districts, West Bengal. **Geophytology** 46(1): 1-14.
- ❖ Pal, P. K. and Karmakar, P. 2013. Pollen analysis in understanding the foraging behaviour of *Apis mellifera* used for apicultural practice in Gangetic West Bengal. **Geophytology** 42(2): 93-114.

#### **Reference for Practical:**

- ❖ David Cramp, 2012. The Complete Step-by-step Book of Beekeeping: A Practical Guide to Beekeeping, from Setting up a Colony to Hive Management and Harvesting the Honey. Lorenz Books. London.
- ❖ David Cramp, 2009. A Practical Manual of Beekeeping: How to Keep Bees and Develop Your Full Potential as an Apiarist. Spring Hill, London.
- ❖ Ted Hooper, 2010. Guide to Bees and Honey: The World's Best Selling Guide to Beekeeping. Northern Bee Books. Oxford.8
- ❖ David Cramp, 2012. The Complete Step-by-step Book of Beekeeping: A Practical Guide to Beekeeping, from Setting up a Colony to Hive Management and Harvesting the Honey. Lorenz Books. London.

### **13. WEB ADDRESS:**

<http://nbb.gov.in/>

[www.kvic.org.in](http://www.kvic.org.in)

[www.honeyflow.com](http://www.honeyflow.com)

[https://practicalaction.org/docs/technical\\_information\\_service/honey\\_processing.pdf](https://practicalaction.org/docs/technical_information_service/honey_processing.pdf)

#### **14. YOU TUBE VIDEOS LINKS:**

<https://www.youtube.com/watch?v=1rhm4uvkcUs>

<https://www.youtube.com/watch?v=I6E0yB0Ev0o>

<https://www.youtube.com/watch?v=RCfNGI4aO4Y>

<https://www.youtube.com/watch?v=J0bl0HqN4Nk>

<https://www.youtube.com/watch?v=GMfCGhyS7fw>

