

**Value Added Course:**  
**"Basic tools of life sciences"**

**Organized by**

**Department of Botany**

**Year**

**2022- 2023**

**Basic tools of life sciences**

**Department of Botany**



**Vivekanand College, Kolhapur. (Autonomous)**  
**Department of Botany**  
**Value Added Course: "Basic Tools of Life Science"**  
**2022-2023**

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**Head**  
Department of Botany  
Vivekanand College  
Kolhapur



# VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

## Department of Botany

Value Added Course

## Basic Tools of Life Sciences



### Course outcome

- Know the uses of various instruments
- Operate different instruments used in life sciences
- Understand principles of different instruments

☎9890962424, 9420434979



**"Education for Knowledge, Science and Culture."**

– Shikshanmaharshi Dr. Bapuji Salunkhe  
Shri Swami Vivekanand Shikshan Sanstha's Kolhapur

**VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)**

**Department of Botany**

**1) Name of the Course: "Basic Tools of Life Science"**

**2) Course Objective :**

1. To familiarize students about various tools used in life science.
2. To educate students on the many principles behind the fundamental life science tools.
3. To educate people about the different needs and tool demands in the present market environment.

**3) Course Outcomes: On completion of the course, students will be able to:**

1. Know the uses of various instruments.
2. Operate the different instruments.
3. Understand the principles of different instruments.

**4) Duration of the course : 6 months**

**5) Expenditure: 25,000/**

**6) Intake capacity: 50 students**

**7) Exam Pattern: Theory and Practical**

- 1) Theory – 50 (hr.)
- 2) Practical - 40 (hr.)

**8) Syllabus:**

**Paper I: Basic Tools of Life Science**

**(50 hr.)**

Unit I: Microscopy: Introduction, principles, types and its applications.

Unit II: Spectroscopy: Introduction, principles, types and its applications.

Unit III: Electrophoresis: Introduction, principles, types and its applications.

Unit IV: Staining techniques: Introduction, principles, types and its applications.

- a) Gram staining    b) Double staining    c) Fungal staining

Unit V: Tissue culture : Introduction, principles and its applications.

Unit VI: Photography: Shutter speed, Aperture, I.S.O, Depth, Picture control and colour control.





Unit VII: Microbial culture: Microorganisms and its types. Culture media, types and examples.

**9) Practical Syllabus:**

**(40 hr.)**

- 1) Study of parts and types of microscopes.
- 2) Study of spectrophotometer.
- 3) Study of agarose gel electrophoresis.
- 4) Study of Gram staining, double staining and fungal staining.
- 5) Study of tissue culture technique.
- 6) Preparation of PDA and NA culture media.
- 7) Demonstration of Lab equipments – Oven, Water bath, Centrifuge, Autoclave, Laminar air flow, Distillation unit and Calorimeter.
- 8) Photography : Understanding exposure, Focusing subject, Depth of field.
- 9) Photography : Camera handling, Accessories. Lens.
- 10) Photo editing and labeling – Basic photo editing and photo cropping.
- 11) Photo editing and labeling – Light and colour adjustment, labeling.

**10) Exam pattern:**

- a) Theory : 50 marks (Multiple choice questions)
- b) Practical : 50 marks

**Suggested Readings**

1. Balasubramaniyan P. and Palaniappan S. P. (2001), Principles and Practices of Agronomy, AgroBios( India)Ltd, Jodhpur.
2. De, G. C. (1989), Fundamentals of Agronomy, Oxford and IBH publishing co., New Delhi.
3. Reddy T. Y and Reddy G.H.S. (1995), Principles of Agronomy, Kalyani Publisher, Ludhiana.
4. Mani, M. S. (1968), General Entomology, Oxford and IBH publishing co., New Delhi.



1. Soil analysis- Structure, Types, pH, Water Holding Capacity, Electrical Conductivity
2. Agronomy- Identification, Morphology, Agronomic Condition
3. Preparation of Vermicompost
4. Biofertilizer
5. Visit to Agricultural Institute

**9) Exam pattern:**

- a) Theory: 50 marks
- b) Practical : 50 marks

**10) Nature of Question Paper for each paper 50 marks**

- |                                       |          |
|---------------------------------------|----------|
| Q1) Multiple choice questions         | 10 marks |
| Q2) Long answer questions (Any two)   | 20 marks |
| Q3) Short answer questions (Any four) | 20 marks |

**Nature of Practical Examinations 50 marks**

- |   |          |
|---|----------|
| Q1) Demonstrate Soil Analysis Experiment assigned to you A  | 10 marks |
| Q2) Identify, give botanical name, Morphology, Agronomic Conditions<br>and Uses of specimen B and C | 20 marks |
| Q3) Identification:   | 10 marks |
| a) Identify and comment D   |          |
| b) Identify and comment E   |          |
| Q4) a) Visit Report   | 05marks  |
| b) Journal  | 05 marks |

**Suggested Readings -**

1. Arun Katyayan (2012). Fundamentals of Agriculture, Kushal Publications, Varanasi.
2. Arunkumar Sharma (2008). A Hand book of organic farming. Agrobios Publishers.



3. N. C. Brady and R. R. Weil (2012) The nature and properties of soils, The 14<sup>th</sup> Edition, by Brady, Nyle C.; Weil, Raymond C., Published by Pearson Eition, Inc., publishing as Prentice Hall, Copyright © 2008.
4. S. B. Chattopadhyay (2018) Principles and Procedures of plant protection, Oxford and IBH Publishers, New Delhi.
5. V. G. Vaidya and K. R. Sahasrabuddhe (1996) Introduction to agronomy and soil and water management Continental Prakashan, Vijaynagar, Pune.



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**VIVEKANAND COLLEGE, KOLHAPUR, (AUTONOMOUS)**

Date: 17/09/2022

**NOTICE**

Department of Botany is organizing Value Added Course entitled  
"Basic Tools of Life Science" in first term which commence from 1<sup>st</sup> October 2022  
(Academic year 2022-2023). Interested students can approach to Botany department for the  
enrollment of the said course.

B.Sc. III chemistry Aslapan

B.Sc. I - A+C Chemistry Spoke  
19.9.22

B.Sc. I Statistics Atul

B.Sc. I - Comp. Sci. Byju  
19/9/22

M.Sc. I - Chem. Amur  
19/9/22

B.Sc. I Botany Bangal

B.Sc. II Botany Tibe  
19/9/22

Bangal  
Head  
17.9.22  
Department of Botany

Head  
Department of Botany  
Vivekanand College  
Kolhapur

B.Sc. III - Microbiology Abu





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VIVEKANAND COLLEGE, KOLHAPUR.(Autonomous)

Department of Botany

Value Added Course : “Basic Tools of Life Sciences”

2022- 2023

| Sr.No. | Name of the Student        | Class                           | Mobile no  | Signature |
|--------|----------------------------|---------------------------------|------------|-----------|
| 1      | Kadam Prasad Chandrashekar | B.Sc. II                        | 7249862963 |           |
| 2      | LoharPranjalParashuram     | B.Sc. II                        | 9420751228 |           |
| 3      | Desai Vaishnavi Sanjay     | B.Sc. II                        | 7620685076 |           |
| 4      | PatilSanikaBhivaji         | B.Sc. II                        | 9022006030 |           |
| 5      | Gavali Nikita sarjerao     | B.Sc. II                        | 7972180304 |           |
| 6      | KatakeSayaliKiran          | B.Sc. II                        | 9623713358 |           |
| 7      | KulkarniSaiVivek           | B.Sc. I                         | 9764274872 |           |
| 8      | Jadhav Karan Dipak         | B.Sc. I                         | 8390623138 |           |
| 9      | HajudeSakshiMukesh         | B.Sc. II                        | 7020256114 |           |
| 10     | DhengeTanviShirish         | B.Sc. II                        | 932153199  |           |
| 11     | VedpathakAditiAtul         | B.Sc. II                        | 7972165605 |           |
| 12     | DavkarePoojaTatyaso        | B.Sc. II                        | 9112172828 |           |
| 13     | KoleSanikaUttam            | B.Sc. II<br>(Biotech<br>Entire) | 8806717734 |           |
| 14     | GuravSmitaRajendra         | B.Sc. II                        | 9075157329 |           |
| 15     | KumbharRasikaAnnaso        | B.Sc. II                        | 9511645661 |           |
| 16     | DevaneVaishnavi Rajesh     | B.Sc. II                        | 9175405700 |           |
| 17     | Dixit SakshiPardip         | B.Sc. II                        | 7709522654 |           |
| 18     | PatilSakshiJaykumar        | B.Sc. II                        | 9075660439 |           |
| 19     | MaskarPrachiPrashant       | B.Sc. III                       | 9859769090 |           |
| 20     | PatilPranotiBahubali       | B.Sc. III                       | 9356339796 |           |
| 21     | Shete Swati Shantinath     | B.Sc. II                        | 6360832545 |           |



|    |                           |                                  |            |                    |
|----|---------------------------|----------------------------------|------------|--------------------|
| 22 | KumbharShwetaPrakash      | B.Sc. II                         | 8149704043 | <i>Shweta</i>      |
| 23 | PatilVaishnaviDhananjay   | B.Sc. II                         | 8007101078 | <i>Vai</i>         |
| 24 | MutheAdityaDnyaneshwar    | B.Sc. II                         | 8010336941 | <i>AD Mthe</i>     |
| 25 | MokashiTanjila Bashir     | B.Sc. III                        | 8483822070 | <i>BSC</i>         |
| 26 | Aga Sayma Samir           | B.Sc. III                        | 7276032822 | <i>Sayma</i>       |
| 27 | ChavanArchanaMahadev      | B.Sc. II                         | 9529950388 | <i>Archana</i>     |
| 28 | Mane AnuradhaAvinash      | B.Sc. II                         | 9309313183 | <i>Anuradha</i>    |
| 29 | JadhavJyotiHanumant       | B.Sc. II                         | 8511947889 | <i>Jadhav</i>      |
| 30 | KumbharSanika Sanjay      | B.Sc. II                         | 9370647296 | <i>Sanika</i>      |
| 31 | ThoratShrutiJaysing       | B.Sc. III                        | 9422684509 | <i>Shruti</i>      |
| 32 | KambleRutujaNetaji        | B.Sc. III                        | 9527429264 | <i>Rutuja</i>      |
| 33 | ThoratIshaManohar         | B.Sc. II                         | 7720904219 | <i>Isha</i>        |
| 34 | SuryawanshiSnehaSuryakant | B.Sc. II                         | 9561348842 | <i>Suryawanshi</i> |
| 35 | GosaviPradnyaSakharam     | B.Sc. II                         | 8767981725 | <i>Pradnya</i>     |
| 36 | PatilSimantiniDevendra    | B.Sc. III                        | 7756040064 | <i>Patil</i>       |
| 37 | PatilRutujaManohar        | B.Sc. III                        | 8262933455 | <i>Rutuja</i>      |
| 38 | KumawatRitu Rajesh        | B.Sc. III                        | 7709318091 | <i>Ritu</i>        |
| 39 | BaralePoojaJyotiram       | B.Sc. II                         | 8767749696 | <i>Pooja</i>       |
| 40 | GharageAshutoshKiran      | B.Sc. III                        | 7887486846 | <i>Ashutosh</i>    |
| 41 | KambleRashmiRajendra      | B.Sc. III                        | 7498873075 | <i>Rashmi</i>      |
| 42 | KamblePradnya Shankar     | B.Sc. III                        | 9028521680 | <i>Pradnya</i>     |
| 43 | MujawarJafarNisar         | B.Sc. II                         | 8080697404 | <i>Jafar</i>       |
| 44 | ShitalBaluBodake          | B.Sc. III                        | 9763051382 | <i>Shital</i>      |
| 45 | RoshanPrakashChikhale     | B.Sc. III<br>(Biotech<br>Entire) | 9019187563 | <i>Roshan</i>      |
| 46 | NehaKrushnatKadam         | B.Sc. III<br>(Biotech<br>Entire) | 9689849952 | <i>Neha</i>        |

1) Fee Per student - 500/-

2) 500 x 46 = 23,000/-



*[Signature]*  
Head  
Department of Botany  
Vivekanand College  
Kolhapur

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Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR.(Autonomous)

Department of Botany

Value Added Course : “Basic Tools of Life Sciences” Attendance

2022- 2023

| Sr.No. | Name of the Student        | Class                           | Mobile no  | Signature |
|--------|----------------------------|---------------------------------|------------|-----------|
| 1      | Kadam Prasad Chandrashekar | B.Sc. II                        | 7249862963 |           |
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| 20     | PatilPranotiBahubali       | B.Sc. III                       | 9356339796 |           |
| 21     | Shete Swati Shantinath     | B.Sc. II                        | 6360832545 |           |





|    |                           |                                  |            |                    |
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| 22 | KumbharShwetaPrakash      | B.Sc. II                         | 8149704043 | <u>Shweta</u>      |
| 23 | PatilVaishnaviDhananjay   | B.Sc. II                         | 8007101078 | <u>Patil</u>       |
| 24 | MutheAdityaDnyaneshwar    | B.Sc. II                         | 8010336941 | <u>AMuthe</u>      |
| 25 | MokashiTanjila Bashir     | B.Sc. III                        | 8483822070 | <u>Mokashi</u>     |
| 26 | Aga Sayma Samir           | B.Sc. III                        | 7276032822 | <u>Aga</u>         |
| 27 | ChavanArchanaMahadev      | B.Sc. II                         | 9529950388 | <u>Chavan</u>      |
| 28 | Mane AnuradhaAvinash      | B.Sc. II                         | 9309313183 | <u>Mane</u>        |
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| 33 | ThoratIshaManohar         | B.Sc. II                         | 7720904219 | <u>Thorat</u>      |
| 34 | SuryawanshiSnehaSuryakant | B.Sc. II                         | 9561348842 | <u>Suryawanshi</u> |
| 35 | GosaviPradnyaSakharam     | B.Sc. II                         | 8767981725 | <u>Gosavi</u>      |
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| 38 | KumawatRitu Rajesh        | B.Sc. III                        | 7709318091 | <u>Kumawat</u>     |
| 39 | BaralePoojaJyotiram       | B.Sc. II                         | 8767749696 | <u>Barale</u>      |
| 40 | GharageAshutoshKiran      | B.Sc. III                        | 7887486846 | <u>Gharage</u>     |
| 41 | KambleRashmiRajendra      | B.Sc. III                        | 7498873075 | <u>Kamble</u>      |
| 42 | KamblePradnya Shankar     | B.Sc. III                        | 9028521680 | <u>Kamble</u>      |
| 43 | MujawarJafarNisar         | B.Sc. II                         | 8080697404 | <u>Mujawar</u>     |
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| 45 | RoshanPrakashChikhale     | B.Sc. III<br>(Biotech<br>Entire) | 9019187563 | <u>Roshan</u>      |
| 46 | NehaKrushnatKadam         | B.Sc. III<br>(Biotech<br>Entire) | 9689849952 | <u>Neha</u>        |



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Department of Botany

Value Added Course : “Basic Tools of Life Sciences”

2022- 2023

Instructions : 1) All the questions are compulsory.

Marks: 50

2) Each question carry two marks.

1. The technique by which small organisms can see is known as -----  
a) chromatography b) microscopy c) electrophoresis d) spectroscopy
2. Plant part was used in tissue culture is known as -----  
a) stock b) scion c) callus d) explant
3. PDA stands for -----  
a) Potato Defined Agar b) Potato Dextrose Agar  
c) Pure Dextrose Agar d) Pure Defined Agar
4. Gram staining technique was developed by -----  
a) N. C. Gram b) H. C. Gram c) H. A. Gram d) A.H. Gram
5. Charged molecules are separated in electric field is known as -----  
a) chromatography b) microscopy c) electrophoresis d) spectroscopy
6. ----- is an unorganised mass of cells .  
a) Embryo b) Callus c) Explant d) Organ
7. Rod shaped bacteria is known as -----  
a) cocci b) rod c) comma d) spiral
8. UV spectroscopy is working on ----- principal.  
a) absorption b) reflection c) translation d) adsorption
9. First electron microscope was designed by -----  
a) Gram b) Michal Twest c) Knoll and Ruska d) Knoll
10. The percentage of alcohol used in Gram's staining is -----  
a) 90-95 b) 50 c) 80 d) 75
11. ----- is the ability of plant cell to regenerate into a whole plant.  
a) Plasticity b) Totipotency c) Incubation d) Explant
12. SEM stands for -----  
a) Scanning Electron Microscope b) Screen Electron Microscope  
c) Stero Electron Microscope d) Screw Electron Microscope





13. In compound microscope ----- is used as source of emission.  
a) electron    b) light    c) water    d) oil
14. ----- spectroscopy technique is associated with molecular emission.  
a) UV visible spectroscopy    b) IR spectroscopy  
c) Fluorescence spectroscopy    d) X – ray diffraction
15. Killing or removal of all forms of microbial life in a material is defined as the process of -----.  
a) incubation    b) inoculation    c) sterilization    d) explant
16. Agar- agar is used as a ----- agent.  
a) liquefying    b) solidifying    c) vapour    d) melting
17. The study of fungi is called as -----.  
a) phycology    b) mycology    c) biotechnology    d) microbiology
18. ----- is the wavelength range for UV spectrum of light.  
a) 400 nm to 700 nm    b) 700 nm to 1 nm  
c) 0.01 nm to 10 nm    d) 10 nm to 400 nm
19. The most commonly used combination of stains in the Gram staining is -----.  
a) safranin & methylene blue    b) crystal violet & safranin  
c) methylene blue & malachite green    d) crystal violet & carbolfuchsin
20. ----- is used for the identification of functional groups of a molecule.  
a) UV-VIS    b) NMR    c) LC-MS    d) IR
21. The transfer of explant on culture medium is known as -----.  
a) isolation    b) inoculation    c) incubation    d) sterilization
22. Fungi can be stained by -----.  
a) safranin    b) iodine    c) lactophenol cotton blue    d) light green
23. In double staining ----- is used to dehydrate the plant material.  
a) light green    b) alcohol    c) xylene    d) cotton blue
24. ----- instrument is used for sterilizing the culture media.  
a) autoclave    b) laminar airflow    c) incubator    d) hot plate
25. SEM and TEM are the types of ----- microscope.  
a) light    b) electron    c) phase contract    d) fluorescence



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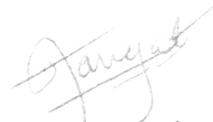
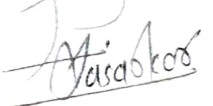
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Shri Swami Vivekanand Shikshan Sanstha's  
VIVEKANAND COLLEGE, KOLHAPUR.(Autonomous)  
Department of Botany  
Value Added Course : "Basic Tools of Life Sciences"  
2022- 2023

| Sr. No. | Roll Number | Name of the student        | Grade          |
|---------|-------------|----------------------------|----------------|
| 1       | 385         | Kadam Prasad Chandrashekar | A              |
| 2       | 386         | Lohar Pranjal Parashuram   | AB             |
| 3       | 387         | Desai Vaishnavi Sanjay     | AB             |
| 4       | 388         | Patil Sanika Bhivaji       | A <sup>+</sup> |
| 5       | 389         | Gavali Nikita sarjerao     | A <sup>+</sup> |
| 6       | 400         | Katake Sayali Kiran        | A <sup>+</sup> |
| 7       | 401         | Kulkarni SaiVivek          | AB             |
| 8       | 402         | Jadhav Karan Dipak         | A              |
| 9       | 403         | Hajude Sakshi Mukesh       | O              |
| 10      | 404         | Dhenge Tanvi Shirish       | O              |
| 11      | 405         | Vedpathak Aditi Atul       | A <sup>+</sup> |
| 12      | 406         | Davkare Pooja Tatyaso      | O              |
| 13      | 407         | Kole anika Uttam           | O              |
| 14      | 408         | Gurav Smita Rajendra       | A <sup>+</sup> |
| 15      | 409         | Kumbhar Rasika Annaso      | A <sup>+</sup> |
| 16      | 410         | Devane Vaishnavi Rajesh    | O              |
| 17      | 411         | Dixit Sakshi Pardip        | A <sup>+</sup> |
| 18      | 412         | Patil Sakshi Jaykumar      | A <sup>+</sup> |
| 19      | 413         | Maskar Prachi Prashant     | A <sup>+</sup> |
| 20      | 414         | Patil Pranoti Bahubali     | A <sup>+</sup> |
| 21      | 415         | Shete Swati Shantinath     | A <sup>+</sup> |
| 22      | 416         | Kumbhar Shweta Prakash     | A <sup>+</sup> |
| 23      | 417         | Patil Vaishnavi Dhananjay  | A <sup>+</sup> |
| 24      | 418         | Muthe Aditya Dnyaneshwar   | A <sup>+</sup> |
| 25      | 419         | MokashiTanjila Bashir      | A <sup>+</sup> |
| 26      | 420         | Aga Sayma Samir            | A <sup>+</sup> |
| 27      | 421         | Chavan Archana Mahadev     | A <sup>+</sup> |
| 28      | 422         | Mane Anuradha Avinash      | A <sup>+</sup> |
| 29      | 423         | Jadhav yoti Hanumant       | A <sup>+</sup> |
| 30      | 424         | Kumbhar Sanika Sanjay      | A <sup>+</sup> |
| 31      | 425         | Thorat Shruti Jaysing      | A <sup>+</sup> |
| 32      | 426         | Kamble Rutuja Netaji       | A              |



|    |     |                             |                |
|----|-----|-----------------------------|----------------|
| 33 | 427 | Thorat Isha Manohar         | A <sup>+</sup> |
| 34 | 428 | Suryawanshi Sneha Suryakant | A <sup>+</sup> |
| 35 | 429 | Gosavi Pradnya Sakharam     | A <sup>+</sup> |
| 36 | 430 | Patil Simantini Devendra    | A              |
| 37 | 431 | Patil Rutuja Manohar        | A <sup>+</sup> |
| 38 | 432 | Kumawat Ritu Rajesh         | A <sup>+</sup> |
| 39 | 433 | Barale Pooja Jyotiram       | A <sup>+</sup> |
| 40 | 434 | Gharage Ashutosh Kiran      | A              |
| 41 | 435 | Kamble Rashmi Rajendra      | A <sup>+</sup> |
| 42 | 436 | Kamble Pradnya Shankar      | A <sup>+</sup> |
| 43 | 437 | Mujawar Jafar Nisar         | A <sup>+</sup> |
| 44 | 438 | Shital Balu Bodake          | A <sup>+</sup> |
| 45 | 439 | Roshan Prakash Chikhale     | O              |
| 46 | 440 | Neha Krushnat Kadam         | A <sup>+</sup> |

Examiners:-

- 1) Dr. B. T. Dangat:- 
- 2) Dr. A. R. Kasarokar:- 





"Education for Knowledge, Science and Culture"  
Shikshanmaharshi Dr. Bapuji Salunkhe



Shri Swami Vivekanand Shikshan Sanstha's

## VIVEKANAND COLLEGE, KOLHAPUR. (Autonomous)

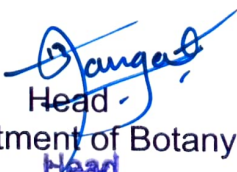
NAAC Reaccredited : "A" (CGPA 3.24), College with Potential for Excellence by U.G.C., New Delhi  
"Star College" by D.B.T. Govt. of India, ISO: 9001-2015

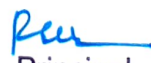
# CERTIFICATE

This is to certify that Aditya Dnyaneshwar Muthe  
\_\_\_\_\_ of \_\_\_\_\_ has passed the Value Added Course in  
'Basic Tools of Life Sciences'

in the Month of April..... year 20 23..... The said certificate has been issued to  
him/her at the Vivekanand College, Kolhapur.

  
Co-ordinator

  
Head  
Department of Botany  
Head  
Department of Botany  
Vivekanand College  
Kolhapur

  
Principal  
**PRINCIPAL**  
Vivekanand College  
Kolhapur