



Project Proposal On

"FIST- PROJECT (Level-0)"

Submitted to

Division :R & D Infrastructure

Programme or Scheme : FIST PG College Level O

Submitted by

Project Investigator:

Dr. Shivaji Devrao Waghmare

SHRI SHIVAJI MAHAVIDYALAYA, BARSHI, SOLAPUR-Barshi

Part 1 : General Information

General Information:

1.Name of the Institute/University/Organisation submitting the Project Proposal :

SHRI SHIVAJI MAHAVIDYALAYA,
BARSHI, SOLAPUR

2. State Maharashtra

3. Principal Investigator Name: Dr. Shivaji Devrao Waghmare

4. Category: SC

5. Type of the Institue : Academic Institutions(Government)

6. Project Title (Project Level): FIST- PROJECT (Level-0)

7. Division : R & D Infrastructure

8. Programme Or Scheme : FIST PG College Level O

9. Academic Area : Chemical Science, Life Science, Physical Science,

10. Application Area : Basic Science,

11. Goverment National Initiative : Swasth Bharat, Digital India, Smart Village,

12. Type of Proposal : Proposal Against Call

13. Project Duration : 5 Years and 0 Months

14. Proposal Submit Date : 04/09/2021

15. Project Keywords : FIST-2021

16. Project Summary :

Part 2: Particulars of Investigators

Principal Investigator:

1. Name: Dr. Shivaji Devrao Waghmare

Gender: Male

Date of Birth: 10/01/1983

Designation : Assistant Professor
Department: Physics
Institute/University: SHRI SHIVAJI MAHAVIDYALAYA, BARSHI, SOLAPUR
State: Maharashtra
District: Solapur
City/Place: Barshi
Address: Shivajinagar Barshi, Tal. Barshi Dist. Solapur
Pin: 413411
Communication Email: shivajiwaghmare1985@gmail.com
Alternate Email: kumarshivaji1985@gmail.com
Mobile: 9850490823
Phone:
Fax:
Category: SC

Co-Investigator: NA

Suggested Refrees: NA

Part 3: Financial Details

Financial Details:

A. Non - Recurring

Equipment

S.	Equipments	Qty.	Justification	1 Year	Total
1 .	Lyophiliser with -50 degree	1	It is used for microbiological applications.	253110	253110
2 .	Magnetic Susceptibility by Gouy's Method unit	1	This unit is used to find magnetic susceptibility of materials.	268273	268273

3.	Laboratory maintenance includes miscellaneous items i.e. glasswares, reagents, kits, chemicals etc.	To run proposed project, Chemicals, substrate, reagents, glasswares and other necessary things will be perched through this grants.	50000	50000	50000	50000	50000	250000
Total			98000	275500	275500	275500	275500	1200000

Budget Head Summary in (INR)

Budget Head	Year-1	Year-2	Year-3	Year-4	Year-5	Total
1- Non-Recurring						
Equipment	12516285	0	0	0	0	12516285
Site Preparation/ Lab Facilities (IF)	620000	20000	20000	20000	20000	700000
Networking (NW)	583000	0	0	0	0	583000
Subtotal (Capital)	13719285	20000	20000	20000	20000	13799285
2- Recurring						
Maintenance (M)	98000	275500	275500	275500	275500	1200000
Subtotal (General Items)	98000	275500	275500	275500	275500	1200000
Total Project Cost (Capital + General)	13817285	295500	295500	295500	295500	14999285

Part 4: PFMS Details

PFMS Unique Code Available: Yes

PFMS Unique Code : ssmb_barshi

Current Ongoing Project: NA

List of Uploaded Documents:-

1. Complete Project proposal
2. Certificate from PI
3. Conflict of interest
4. Endorsement from head of Institute
5. Quotation for Equipments

APPLICATION FOR PG COLLEGES AT LEVEL 0

FIST – 2021

1. a) Name of the college & Year of Establishment :

Shri Shivaji Mahavidyalaya Barshi & 1960

- b) Name of the post-graduate Department & Year of commencement of PG Program:

Sr. No.	Name of Post-graduate Department	Year of commencement
1	Microbiology	2005
2	Physics	2018
3	Chemistry	2018
4	Botany	2020
5	Zoology	2020

- c) Address for correspondence including Telephone, Telegram, FAX, e-mail etc.:

Shri Shivaji Mahavidyalaya, Barshi
Shivajinagar, Barshi, Tal. Barshi
Dist. Solapur, Maharashtra, INDIA-413411
Telephone: 02184-222382
Fax: 02184-222382
Email: ssmb_barshi@rediffmail.com
Website: www.ssmbarshi.org.in

- d) Program Co-ordinator:
(for correspondence)

Dr. Shivaji Devrao Waghmare

Assistant Professor

E-mail: shivajiwaghmare1985@gmail.com

e) Year of commencement of PG Program in the Department & Its financial Status (General/Self-financed):

2018 & Self-Financed

Name of the PG Department	Year of Support	Total support provided with details
<i>Physics, Chemistry, Microbiology, Botany, Zoology</i>	<i>2018-19</i>	Buildings- 1,80,000/- -(for furniture only) Equipments- 1,50,000/- Book Supplies and Materials- 75,000/- Recruitment of staff- 4,05,000/- Total- 8,10,000/-
	<i>2019-20</i>	Buildings- Nil Equipments- 1,50,000/- Book Supplies and Materials- 75,000/- Recruitment of staff- 3,60,000/- Total-5,85,000/-
	<i>2020-21</i>	Buildings- 1,20,000/- -(for furniture only) Equipments- 1,50,000/- Book Supplies and Materials- 125,000/- Recruitment of staff- 6,60,000/- Total-10,55,000/-

2. Status of the College (scan and upload supporting documents along with the proposal)

a) Academic Status [Affiliated College/ Autonomous College/ Constituent College]

Affiliated College

(Punyashlok Ahilyadevi Holkar, Solapur University, Solapur)

(Annexure-I)

b) Financial Status [Govt. (Central and State Govt.) / Govt. aided / Private Colleges]

Government aided

(Annexure-II)

i) Upload the copy of 2f and 12B Certificate issued by UGC along with the online submitted proposal;

Yes

(Annexure-III)

3. Whether the College is accredited by NAAC/ NBA or any other relevant agency. If so, please specify the Grading or Rating by those Agencies:

Name of Accreditation Agency	Rank/Grading/Rating	Year of Accreditation
DBT Delhi	Star College Status	2020
NAAC	A (CGPA-3.14)	2019
PAHS University	Best College Award	2018
NIRF	Rank Band : 100-150	2017
DBT Delhi	Star College	2017
PAHS University (AAA)	A++	2016

4. Department-wise Number of Faculty Members with Qualifications:

<i>Name of UG and PG Departments</i>	<i>Number of Faculty Member</i>	<i>Qualifications</i>
Physics	UG- 10	Post-Graduate-10
	PG-07	Doctoral-06
Chemistry	UG-17	Post-Graduate-13
	PG-09	Doctoral- 06
Microbiology	UG-10	Post-Graduate-07
	PG-07	Doctoral- 03
Botany	UG-07	Post-Graduate-05
	PG-06	Doctoral- 02
Zoology	UG-08	Post-Graduate-05
	PG-06	Doctoral- 05

5. Department-wise Number of Students during last three years admitted and passed:

Name of PG Department	Admitted			Passed		
	2018	2019	2020	2018	2019	2020
Physics	18	15	16	-	16	14
Chemistry	25	25	30	-	22	23
Microbiology	27	29	29	25	16	27
Botany	-	-	19	-	-	-
Zoology	-	-	18	-	-	-

6. Department-wise percentage Cut-off Marks of students admitted during last three years:

Name of PG Department	%-Cut-off Marks in UG Level Admission			%-Cut-off Marks in PG Level Admission		
	2018	2019	2020	2018	2019	2020
Physics	Open-64 SC/ST-58 OBC-62	Open-62 SC/ST-56 OBC-60	Open-65 SC/ST-56 OBC-63	Open-77 SC/ST-69 OBC-74	Open-78 SC/ST-65 OBC-69	Open-75 SC/ST-63 OBC-70
Chemistry	Open-64 SC/ST-58 OBC-62	Open-62 SC/ST-56 OBC-60	Open-65 SC/ST-56 OBC-63	Open-72 SC/ST-66 OBC-70	Open-70 SC/ST-60 OBC-68	Open-75 SC/ST-70 OBC-67
Microbiology	Open-64 SC/ST-58 OBC-62	Open-62 SC/ST-56 OBC-60	Open-65 SC/ST-56 OBC-63	Open-82 SC/ST-69 OBC-71	Open-85 SC/ST-68 OBC-72	Open-83 SC/ST-72 OBC-75
Botany	Open-64 SC/ST-58 OBC-62	Open-62 SC/ST-56 OBC-60	Open-65 SC/ST-56 OBC-63	-	-	Open-73 SC/ST-59 OBC-67
Zoology	Open-64 SC/ST-58 OBC-62	Open-62 SC/ST-56 OBC-60	Open-65 SC/ST-56 OBC-63	-	-	Open-70 SC/ST-55 OBC-65

7. University Rank of Students at UG and PG Level University Examinations:

UG and PG Programs	University Ranks during last 3 Years		
	2018	2019	2020
UG Program	2	-	6
PG Program	3	3	1

8. Number of Students qualified NET/GATE/INSPIRE or any other qualifying examination during last 3 years:

UG and PG Programs	No. of students qualify NET/GATE/INSPIRE etc during last 3 years		
	2018	2019	2020
UG Program	NET-NA GATE-NA SLET(SET)-NA INSPIRE-07	NET-NA GATE-NA SLET(SET)-NA INSPIRE-08	NET-NA GATE-NA SLET(SET)-NA INSPIRE-06
PG Program	NET-02 GATE-04 SLET(SET)-04 INSPIRE-NIL	N NET-03 GATE-04 SLET(SET)-07 INSPIRE-NIL	NET-01 GATE-04 SLET(SET)-07 INSPIRE-NIL

9. Name of the Departments supported already in the College under FIST Program:

NIL

10. Indicate the development grant received from UGC/AICTE during the Twelfth and Thirteenth Plan.

<i>Budget Head</i>	<i>12th plan</i>	<i>13th Plan</i>
Building	40,00,000/-	-
Equipment	4,12,825/-	-
Books	54,922/-	-
Maintenance of Equipment	72,043/-	-
Improvement of facilities	3,98,537/-	-
Competency Building	-	-
EXAM REFORM	-	-
Educational innovation	-	-
Field work	-	-
Extension activities	3,00,000/-	-
Recurring grants	-	-
Contingency meeting, Honorarium to advisor	50,000/-	-
General development assistance	-	-
IQAC	3,00,000/-	-
Grant for Community college	92,05,000/-	-
Faculty Improvement Program (Three Teachers are benefited in year between 2015 to 2017)	37,11,390/-	-
TOTAL	1,85,04,717/-	-

11. Has the College received any major infrastructure research grant during the last five years from S&T agencies including UGC/AICTE? If yes, details.

Heads	Name of Agency	Scheme	year	amount
Building Equipment Books Supplies and Materials Computing & Networking Facilities	DBT	Star College	2017	69,00,000/-
Building Equipment Books Supplies and Materials Computing & Networking Facilities	DBT (e-mail received)	Star college Status	2020	1,89,00,000/-

12. Details of research grant received from different agencies during the last five years:

Name of the Investigator	Project	Title of the project and duration	Amount sanctioned	Funding Agency
Dr. Asawari Madhukar Fartade	SR/WOS-A/LS-1141/2014(G)	Studies on biodiversity of helminth parasite in fresh water fishes and birds in solapur and Osmanabad district (M.S.) India. <i>Three years</i>	25,03,000/-	DST
Dr. Jalkute Chidambar Balbhim	PDF/2016/000824	Multistage utilization of fish waste for the recovery and production of value added products <i>Two years</i>	19,20,000/-	DST-SERB

13. Indicate the research activities of the faculty members as per the following pro-forma

Name and Designation of Faculty	Major areas of Research	Number of Ph.Ds Produced (in last 5 years)
Dr. Thorat Prakash Ramrao Professor & Principal	Microbiology	Awarded: 06. 1 (Postdoctoral Scholar) Working :03
Dr. Deokar Satish Dinkarrao Associate Professor & HOD	Microbiology	Awarded: Working :
Dr. Kabbur Sadhana Mahalingappa Professor & HOD	Magnetic properties	Awarded: Working :
Dr. Kothawale Rameshwar Raosaheb Professor	Superconductivity, Nanomaterials	Awarded: 01 Working : 05
Dr. Shivaji Devrao Waghamare Assistant Professor	Synthesis of nanomaterials for energy applications	Awarded: Working :
Dr. Ghodake Uttam Ramhari Professor	Magnetic properties	Awarded: 02 Working :
Dr. Deshmukh Kiran Prabhakar Professor	Application of Electronics	Awarded: Working :
Dr. Lokhande Tukaram Namdeo Professor & HOD	Inorganic Chemistry	Awarded: Working : 02
Dr. Shaikh Abdul Babulal Professor	Analytical Chemistry	Awarded: Working :
Dr. Gaikwad Shashikant Harishchandra Professor	Inorganic Chemistry	Awarded: 03 Working : 02
Dr. Gurame Vashishtha Madhukar Assistant Professor	Physical Chemistry	Awarded: Working : 02
Dr. Jamale Dattatraya Kashinath Associate Professor	Analytical Chemistry	Awarded: Working :

Dr. Salunkhe Sandhya Sunil Professor & HOD	Zoology	Awarded: Working :
Dr. Smt. Gavhane UshaVithalrao Professor	Zoology	Awarded: Working :
Dr.Chati Ravindra Shashikant Professor	Zoology	Awarded: Working :02
Dr.Gaikwad Anant Mahadeo Assistant Professor	Zoology	Awarded: Working :
Dr. Sou. Gaikwad Sandhyatai Sampatrao Associate Professor & HOD	Botany	Awarded: Working :
Dr.Gaikwad Sampatrao Pandurang Assistant Professor	Botany	Awarded: Working :

14. a) **List of Research Publications in SCI Journals coming from the College during the last five years.**

(Scopus Indexed)

1. Sadlapurkar AV, Barache UB, Shaikh AB, Gaikwad SH, Lokhande TN. 2021. 2-chlorobenzaldehyde thiocarbohydrazone: a novel reagent for liquid-liquid extractive spectrophotometric determination of copper(II) from environmental and real samples. *International Journal of Environmental Analytical Chemistry. In press.*
2. Kabbur SM, Nadargi DY, Kambale RC, Ghodake UR, Suryavanshi SS. 2021. Microstructure and magnetic interactions of Co²⁺ substituted NiCuZn ferrites *Journal of Magnetism and Magnetic Materials.* 517:167376.
3. Deodware SA, Barache UB, Chanshetti UB, Gaikwad SH, Prasad Kollur S. 2021. Newly synthesized triazole-based Schiff base ligands and their Co(II) complexes as antimicrobial and anticancer agents: Chemical synthesis, structure and biological investigations. *Results in Chemistry.* 3: 100162
4. Shaikh AB, Barache UB, Khogare BT, Wadgaonkar PP, Gaikwad SH.2021. Highly reproducible, simple and selective analytical method for extractive UV–visible spectrophotometric determination of ruthenium(III): Analysis of catalyst, fission alloy and sequential separation. *SpectrochimicaActa - Part A: Molecular and Biomolecular Spectroscopy.* 243: 118814.
5. Awalekar R, Mohire P, Valekar N, Jamale DK, Kolekar G, Anbhule P. 2020. A total and convergent synthesis of (7Z,11Z,13E)-7,11,13-Hexadecatrienal, the major sex pheromone component of the citrus leafminer, *Phyllocnistiscitrella.* *Chemical Data Collections.* 30: 100567.

6. Gaikwad SH, Barache UB, Lokhande TN, Anuse MA. 2020. Experimentally validated extractive spectrophotometric determination method of osmium(VIII) from environmental samples: sequential separation of osmium(VIII), rhodium(III) and ruthenium(III). *International Journal of Environmental Analytical Chemistry*. 1: 1–21.
7. Waghmare SD, Raut SD, Ghule BG, Thamer BM, Mane RS. 2020. Pristine and palladium-doped perovskite bismuth ferrites and their nitrogen dioxide gas sensor studies. *Journal of King Saud University - Science*. 32(7): 3125–3130.
8. Karad DD, Somani Y, Khande H, Yadav B, Kharat AS. 2020. Molecular characterization of a multidrug-resistant/pandrug-resistant nosocomial polymicrobial infection with *Klebsiellapneumoniae*, *Providenciarettgeri*, and *Acinetobacterbaumannii* from Rural Maharashtra, India. *ActaBiochimicaPolonica*. 67: 5239.
9. Kabbur SM, Waghmare SD, Nadargi DY, Ghodake UR, Suryavanshi SS. 2019. Magnetic interactions and electrical properties of Tb³⁺ substituted NiCuZn ferrites. *Journal of Magnetism and Magnetic Materials*. 473: 99-108.
10. Jamale DK, Gurame VM, Valekar NJ, Kolekar GB, Anbhule PV. 2019. An Efficient Protocol for the Synthesis of Pyrido[2,3-d]pyrimidines in Glycerol–Water Medium: Assessment by Green Chemistry Metrics. *Macromolecular Symposia*. 387(1): 1800202.
11. Barache UB, Shaikh AB, Deodware SA, Lokhande TN, Gaikwad SH. 2019. Sensitive and selective liquid-liquid extractive spectrophotometric determination of Bismuth(III) from water, pharmaceuticals and synthetic mixtures. *Groundwater for Sustainable Development*. 9: 100221.
12. Barache UB, Shaikh AB, Deodware SA, Lokhande TN, Gaikwad S.H. 2019. A new experimental approach for liquid-liquid extractive spectrophotometric determination of chromium(VI) in tannery wastewater and alloy samples *International Journal of Environmental Analytical Chemistry*. 99(7): 621–640.
13. Barache UB, Khogare BT, Shaikh AB, Lokhande TN, Gaikwad SH. 2019. Selective and sensitive liquid-liquid extraction and spectrophotometric determination of tellurium(IV) using sulfur containing reagent. *Chemical Data Collections*. 19: 100173.
14. Jamale DK, Undare SS, Valekar NJ, Kolekar GB, Anbhule PV. 2019. Glycerol Mediated Synthesis, Biological Evaluation, and Molecular Docking Study of 4-(1H-pyrazol-4-yl)-polyhydroquinolines as Potent Antitubercular Agents. *Journal of Heterocyclic Chemistry*. 56(2): 608–618.
15. Waghmare SD, Jadhav VV, ShaikhSF, Rhee JH, O'Dwyer C. 2018. Sprayed tungsten-doped and undoped bismuth ferrite nanostructured films for reducing and oxidizing gas sensor applications. *Sensors and Actuators, A: Physical*. 271: 37–43.
16. Kate P, Gaikwad S, Lokhande T, Choudhari P, Bachute M. 2018. Synthesis of schiff base as DNA gyrase B inhibitor, antibacterial, anti-inflammatory and antioxidant agents. *Rasayan. Journal of Chemistry*. 11(4):1441–1450.
17. Thorat LM, Patil JY, Nadargi DY, Ghodake UR, Kambale RC, Suryavanshi SS. 2018. Co²⁺ substituted Mg–Cu–Zn ferrite: Evaluation of structural, magnetic, and electromagnetic properties. *Journal of Advanced Ceramics*. 7(3): 207-217.

18. Jamale DK, Vibhute SS, Undare SS, Kolekar GB, Anbhule PV. 2018. Unexpected formation of 4,5-dihydro-1H-pyrazolo[3,4-b]pyridine derivatives as a potent antitubercular agent and its evaluation by green chemistry metrics. *Synthetic Communications*. 48(21): 2750–2760.
19. Patil PT, Warekar PP, Patil KT, Jamale DK, Deshmukh MB, Anbhule PV. 2018. A simple and efficient one-pot novel synthesis of pyrazolo[3,4-b][1,8]naphthyridine and pyrazolo[3,4-d]pyrimido[1,2-a]pyrimidine derivatives as anti-inflammatory agents. *Research on Chemical Intermediates*. 44(2): 1119–1130.
20. Barache UB, Shaikh AB, Lokhande TN, Anuse MA, Gaikwad SH. 2018. An efficient, cost effective, sensing behaviour liquid-liquid extraction and spectrophotometric determination of copper(II) incorporated with 4-(4'-chlorobenzylideneimino)-3-methyl-5-mercapto-1, 2, 4-triazole: Analysis of food samples, leafy vegetables, fertilizers and environmental samples. *SpectrochimicaActa - Part A: Molecular and Biomolecular Spectroscopy*. 189: 443–453.
21. Thorat LM, Patil JY, Nadargi DY, Ghodake UR, Kambale RC, Suryavanshi SS. 2018. Ni²⁺-substituted Mg–Cu–Zn ferrites: a colloidal approach of tuning structural and electromagnetic properties. *Journal of Sol-Gel Science and Technology*. 86(3): 731–742.
22. Kabbur SM, Ghodake UR, Nadargi DY, Kambale RC, Suryavanshi SS. 2018. Effect of Dy³⁺ substitution on structural and magnetic properties of nanocrystalline Ni-Cu-Zn ferrites. *Journal of Magnetism and Magnetic Materials*. 451: 665–675.
23. Kabbur SM, Ghodake UR, Kambale RC, Chikhale LP, Suryavanshi SS. 2017. Magnetic, Electric and Optical Properties of Mg-Substituted Ni-Cu-Zn Ferrites. *Journal of Electronic Materials*. 46(10):5693–5704.
24. Barache UB, Shaikh AB, Lokhande TN, Gurame VM, Gaikwad SH. 2017. Acid switched efficient, cost effective, selective separation and determination of selenium(IV). *Journal of Environmental Chemical Engineering*. 5(5): 4828–4840.
25. Vibhute S, Jamale D, Undare S, Kolekar G, Anbhule P. 2017. An efficient, one-pot three components synthesis of [1,2,4] triazoloquinazolinone derivatives using anthranilic acid as green catalyst. *Research on Chemical Intermediates*. 43(8): 4561–4574.
26. Warekar PP, Patil PT, Patil KT, Jamale DK, Kolekar GB, Anbhule PV. 2017. PTSA-catalyzed straightforward novel approach for the synthesis of 1,2-bis(4-nitrophenyl)-1H-benzo[f]chromen-3-amine and the evaluation of their antituberculosis activity. *Research on Chemical Intermediates*. 43(7): 4115–4127.
27. Patil PT, Warekar PP, Patil KT, Jamale DK, Kolekar GB, Anbhule PV. 2017. Uncatalyzed synthesis of new substituted dihydro-2H-dipyrimido[1,2-a,4,5-d]pyrimidine-2,4(3H)-dione. *Research on Chemical Intermediates*. 43(7): 4103–4114.
28. Vibhute S, Jamale D, Undare S, Kolekar G, Anbhule P. 2017. A bio-oriented anthranilic acid catalyzed synthesis of quinazolin-8 (4H)-one derivatives: Evaluation by green chemistry metrics. *Synthetic Communications*. 47(19): 1747–1757.
29. Patil KT, Jamale DK, Valekar NJ, Kolekar GB, Anbhule PV. 2017. Uncatalyzed four-component synthesis of pyrazolopyranopyrimidine derivatives and their antituberculosis activities. *Synthetic Communications*. 47(2): 111–120.

30. Nandimath AP, Karad DD, Gupta SG, Kharat AS. 2017. Consortium inoculum of five thermo-tolerant phosphate solubilizing actinomycetes for multipurpose biofertilizer preparation. *Iranian Journal of Microbiology*. 9(5): 295–304.
31. Shaikh AB, Barache UB, Anuse MA, Gaikwad SH. 2016. 4-4'-nitrobenzylideneimino)-3-methyl-5-mercapto-1, 2, 4-triazole, a new chromogenic reagent for extractive spectrophotometric determination of copper (II) in pharmaceutical and alloy samples. *South African Journal of Chemistry*. 69: 157–165.
32. Valekar NJ, Undare SS, Jamale DK, VibhuteSS, Deshmukh MB, Anbhule PV. 2016. A simple and green synthesis of highly functionalized quinoline derivatives using zinc oxide nanoparticles. *Indian Journal of Chemistry - Section B Organic and Medicinal Chemistry*. 55B(12): 1548–1554.
33. Undare SS, Valekar NJ, Patravale AA, VibhuteSS, Deshmukh MB, Anbhule PV. 2016. One-pot synthesis and in vivo biological evaluation of new pyrimidine privileged scaffolds as potent anti-inflammatory agents. *Research on Chemical Intermediates*. 42(5), pp. 4373–4386.
34. Undare SS, Valekar NJ, Patravale AA, Deshmukh MB, Anbhule PV. 2016. Synthesis, anti-inflammatory, ulcerogenic and cyclooxygenase activities of indenopyrimidine derivatives. *Bioorganic and Medicinal Chemistry Letters*. 26(3): 814–818.

(Without Scopus Indexed)

1. Bhise DS, Telave AB. 2021. Population Structure and Regeneration status of *Xylocarpus granatum* Koen. At Revadanda Mangrove forest (Maharashtra). *International Journal of Creative Research Thoughts*. 9(3): 4584-4588.
2. Bhise DS, Telave AB. 2021. Studies On Some Physicochemical Properties And Heavy Metal From Sediments And The Leaves Of *Xylocarpus Granatum* Koenig From Revadanda And Jaigad Estuary Of Maharashtra Coast (India). *International Journal of Researches In Biosciences, Agriculture And Technology*. 17:318-323.
3. Pawar SU, Rajure RK, Waghmare SD, Kothawale RR. 2021. Structural Study of Mn dopant and optical behavior of Fe₂O₃ nanoparticles. *Int. Joun. Of Sci. rec. in Sci.&Tech*. 9(2): 1-3.
4. Jadhav SR, Pawar ST, Karad D, Shelke R. 2021. Studies On Multi Drug Resistant *Klebsiella Pneumoniae*. *Asian Journal of Research in Chemistry and Pharmaceutical Sciences*. 9(1): 20-26.
5. Pawar PR, Rokade AG, Supnekar SP, Meshram LN, Pawar NB, Gavhane UV. 2020. Diversity and Distribution of Snake in Adjoining Areas of Panvel, Navi Mumbai, West Coast of India. *International Journal of Zoological Investigations*. 6(2): 289-300.
6. Gurame VM. 2020. Kinetics and Mechanism of Oxidation of Glutathione by Waugh-Type Enneamolybdomanganate (IV) in Aqueous Perchloric Acid (Oct 2020). *Macromolecular symposia* 9(1):5-10.
7. Fartade AM, Salunkhe SS. 2019. Reporting a New Species of *Sengafartadensis* in a freshwater fish *Mastacembelusaermatus* from Solapur and Osmanbad District. *Scholarly Research Journal Interdisciplinary studies*. 7/55: 12742-12750.
8. Devkar SD. 2019. Microbial Decolourization of Textile Dyes and Biodegradation of Textile Industrial Effluent from Solapur city, (MS), India. *Current Global Reviewer*. 9(3): 112-123.

9. Jadhav SS, Gavhane UV, Pawar NA, Mushan LC. 2019. Population Dynamic Study & Intestinal Tapeworms In Gallus Gallus Domestics At Solapur Region. World Journal of Pharmaceutical Research. 8(6): 1-6.
10. Gavhane U. 2019. Study on Bioelectricity Generation using Plant Microbial Fuel Cell & Bacterial Fuel cell with Pure Culture. An international Multidisciplinary Quarterly Research Journal: Ajanta. 9(2): 88-99.
11. Jadhav SR, Pawar ST, Karad DD. 2019. Extended and Pan-drug resistance in Klebsiellapneumoniae due to Carbapenemase and Extended Spectrum β -lactamase enzymes. Journal of Medical Science and Clinical Research. 7(12):498-509.
12. Devkar SD. 2019. Phosphate Solubilising Bacteria (PSBs): Sustainable Approach For Managing Phosphorus Deficiency in Agricultural Soils in Barshi Region (MS), India. Current Global Reviewer. 9(3): 16-23.
13. Devkar SD. 2018. Some studies on Tube well Water Quality and Bacteriological contamination in Barshi Town. (MS), India. Current Global Reviewer. 4(8): 49-54.
14. Devkar SD. 2018. Evaluation of bacteriological quality of ice creams and milk shakes marketed in Barshi city, Maharashtra, India. Current Global Reviewer. 2(8): 23-35.
15. Gavhane U. 2018. Diversity of fish Faunta at Chandani Dam (Pimpalwadi)(M.S.). An international Multidisciplinary Quarterly Research Journal: Ajanta. 7(2): 37-51.
16. Pawar SU, Kothawale RR. 2018. Effect of Mn dopant on structural and optical behavior of Fe₂O₃nano particles. Int. Joun. of multifaceted and multilingual studies. 2: 63-67.
17. Devkar SD. 2018. Bacteriological Quality of Freshly Squeezed sugar-cane juices and public health risks vended in Solapur district, Maharashtra, India. Current Global Reviewer. 2(8): 49-57.
18. Devkar SD. 2018. Bioactivity study of Tridaxprocumbens extracts on Staphylococcus aureus. Current Global Reviewer. 3(8): 22-29.
19. Devkar SD. 2018. Isolation and Characterization Study of Feather Degrading Bacteria. Int. Jr Pharmacy & Pharm.research. 14(1):1-6.
20. Fartade A, Chati R, Salunkhe S, Gavhane U. 2017. Seasonal study of parasitic infection in fresh water fishes from Solapur and Osmanabad District (M.S), India. International Journal of Fisheries and Aquatic Studies. 5(5): 198-201.
21. Fartade AM, Chati RS. 2017. On a new tapeworm, Circumoncobothriumgovindii of fresh water fi shChannamarulius from Godavari basin India. Biosci. Biotech. Res. Comm. 10(2): 63-67.
22. Fartade A, Chati R. 2017. Histopathological Changes In Fresh Water Fish MastacembelusArmatus Infected With Cestode Parasite From Solapur And Osmanbad District (M.S) India. International Journal Of Researches In Biosciences, Agriculture And Technology. 5(3): 14-15.
23. Devkar SD. 2017. Isolation and Characterization of Multiple Antibiotic Resistant Aeromonas spp. from Urinary Stone of Urolithiasis Patients. Int. J. Pharm. Sci. Rev. Res. 45(2):104-109.
24. Devkar SD. 2017. Study of Antibacterial Activity of Palm Wine against Bacterial Pathogens Isolated From the Clinical Samples. Int. J. Pharm. Sci. Rev. Res. 45(2): 138-141.
25. Salunkhe SS, Dama IB. 2017. Destruction of habitat of Ardeotisnigriceps in Solapur district (MH).International Journal of researches in Biosciences agriculture and

- biotechnology. 5(3): 114-118. Fartade AM, Chati RS. 2016. Population Dynamics Of Helminth Parasite In Fishes From Solapur And Osmanabad Dist (M.S) India. International Journal of Advanced Research. 4(8):427-430.
26. Fartade AM, Chati RS. 2016. Circumoncobothrium godavaraen.sp. from channamarulius (Hamilton, 1822) from Godavari basin (M.S) India. International Journal of Scientific and Research Publications. 6(1): 203-207.
 27. Fartade A, Chati R. 2016. Biochemical studies on cestode parasites in Gallus gallus domesticus in Solapur and Osmanabad district, M.S (India). International Journal of Fauna and Biological Studies. 3(4): 109-110.
 28. Shinde SV, Salunkhe SS. 2016. Studies on the mounds of termites Kumbhej (Great Indian Bustard Sanctuary) Karmala, Dist. Solapur, (M.S.), India. Trends in life Sciences An International Journal. 5(2):1-3.
 29. Gavhane U. 2016. A Molluscan Pest (Giant African Snail) Found on Morus Alba (V1) In Solapur District, (N.S.) India. Research journal of life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences. 2(4): 62-66.
 30. Fartade A, Chati R, Salunkhe S, Gavhane U, Gaikwad A. 2016. Seasonal variation in the population dynamics of helminth parasites in Gallus gallus domesticus from Solapur and Osmanabad District (M.S), India. International Journal of Fisheries and Aquatic Studies. 7: 71-73.
 31. Gaikwad AM, Chavan RJ, Gunjal AV, Gavhane UV, Chati RS. 2016. Studies on occurrence of Chironomidae larvae (Diptera:Chironomidae) from Rena river. International refereed multidisciplinary journal of contemporary research. 9: 107-109.
 32. Mohite RM, Ansari JN, Roy AS, Kothawale RR. 2016. Significant Enhancement in the conductivity of Al-doped Zinc oxide thin films for TCO Application. International journal of nanoscience. 15(1): 1650011.

b) List of Publications in Conference Proceedings during last five years.

1. S.S. Jadhav, U.V. Gavhane, R.S. Chati, N.A. Pawar and L.C. Mushan. Study of Population Dynamic Tapeworms In Gallus Gallus Domesticus from Solapur Region. International conference on Advances in Pure and Applied Sciences ICAPAS-2019:51-54.
2. V.D. Bachuwar, U.R. Ghodake, A. Lakhssassi, and Suryavanshi S.S. WSN/Wi-Fi microchip-based agriculture parameter monitoring using IoT. Proceedings of the International Conference on Smart Systems and Inventive Technology, ICSSIT-2018: 214–219.
3. S.M. Kabbur, S.D. Waghmare, U.R. Ghodake and S.S. Suryavanshi, Synthesis, morphology and electrical properties of Co²⁺ substituted NiCuZn ferrites for MLCI applications. AIP Conference Proceedings-2018. 1942: 130002.
4. P.A. Ghadage, U.R. Ghodake, J.Y. Patil and S.S. Suryavanshi. Effect of Dy substitution on the Structural and Gas sensing Properties of BiFeO₃. IOP Conference Series: Materials Science and Engineering-2018. 360(1): 012063.
5. S. M. Kabbur, U.R. Ghodake and S.S. Suryavanshi. Dysprosium-Substitution Induced Changes in Structural, morphological and Electrical properties of NiCuZn ferrites: Advanced Science Letters, August 2018. 24 (8) 1: 5843-5848.
6. V.D. Bachuwar, U.R. Ghodake, A. Lakhssassi and S.S. Suryavanshi. WSN/Wi-Fi Microchip-Based Agriculture Parameter Monitoring using IoT. Proceeding of the

International conference on smart systems and inventive technology (ICSSIT 2018) Dec-2018 at Tirunelveli ,tamil Nadu,India.

7. P.A. Ghadage, U.R. Ghodake, R.C. Kambale and S.S. Suryavanshi. Structural and dielectric properties of pure and Dy³⁺ substituted BiFeO₃ particles synthesized by auto-combustion method. AIP Conference Proceedings-2017.1837: 040039.
8. U. R. Ghodake, L. P. Chikhale, and S. S. Suryavanshi. Structural characterization of zinc substituted magnesium ferrites by co-precipitation technique using oxalate precursors. AIP Conference Proceedings. May 2017: 040022-1 to 040022-3.
9. U. Ajinkya, U. Ghodake, and G. Sucharitha. Low power VLSI design Techniques: A Review. In the 2nd National Conference on Recent Advances in Electronics, held on 24th&25th February-2017 at ICFAI Tech School, IFHE, Hyderabad.
10. R.M. Mohite, J.N. Ansari, A.S. Roy and R.R. Kothawale. Significant enhancement in the conductivity of Al-Doped Zinc oxide thin films for TCO application. International Journal of Nanoscience-2016. 15(4): 1650011.

c) List of scientific/ technical Books written by Faculty Members in the College.

Sr. No.	Title of Book	ISBN	Author
1	Textile Wastes: Characterization and Treatment Environmental Pollution and Management of Wastewaters by Microbial techniques	81-85771-26-X	Dr. P.R.Thorat
2	NiCuZn Ferrite: Synthesis and Characterization	978-93-86369-92-5	Dr. S.M. Kabbur
3	Synthesis, Characterisations, Magnetic And Electrical Properties Of Terbium And Dysprosium Substituted Nicuzn Ferrites	978-81-947182-6-0	Dr. S.M. Kabbur
4	Basic Circuit Theory and Network Theorems (Circuit elements, Circuit Fundamentals, AC Circuits, Network Theorems and Two Port Network)	978-93-86013-10-1	Dr. U. R. Ghodake
5	Digital fundamentals (Number System, Binary Codes, Logic Gates, Boolean algebra, Arithmetic Circuits)	978-93-86013-08-8	Dr. U. R. Ghodake
6	Semiconductor Devices	978-93-86013-37-8	Dr. U. R. Ghodake
7	Digital Electronics (TTL, Combinational circuits, Flip flops, Counters, shift registers)	978-93-86013-42-2	Dr. U. R. Ghodake
8	Phase Sensitive Detector: Fabrication, Processing, and Applications	978-3-319-53555-5	Dr. U. R. Ghodake
9	Text book of Physics B.Sc. I Sem-I, Paper-I,	978-81-933070-0-7	Dr. R.R. Kothawale
10	Text book of Physics B.Sc. I Sem-I, Paper-II	978-81-933070-1-4	Dr. R.R. Kothawale
11	Text book of Physics B.Sc. I Sem-II,	978-81-934102-4-0	Dr. R.R. Kothawale

	Paper-III,		
12	Text book of Physics B.Sc. I Sem-II, Paper-IV,	978-581-934102-5-7	Dr. R.R. Kothawale
13	Text book of Physics B.Sc. II Sem-III, Paper-V,	978-93-86766-00-7	Dr. R.R. Kothawale
14	Text book of Physics B.Sc. II Sem-III, Paper-VI,	978-93-86766-01-4	Dr. R.R. Kothawale
15	Text book of Physics B.Sc. II Sem-IV Paper-VII,	978-93-86766-36-6	Dr. R.R. Kothawale
16	Text book of Physics B.Sc. II Sem-IV, Paper-VIII,	978-93-86766-43-4	Dr. R.R. Kothawale
17	Text book of Physics B.Sc. I Sem-I, Paper-I,	978-93-86766-89-2	Dr. R.R. Kothawale
18	Text book of Physics B.Sc. I Sem-I, Paper-II,	978-93-86766-90-8	Dr. R.R. Kothawale
19	Text book of Physics B.Sc. II Sem-III, Paper-V,	978-93-89343-34-2	Dr. R.R. Kothawale
20	Text book of Physics B.Sc. II Sem-III, Paper-VI,	978-93-89343-35-9	Dr. R.R. Kothawale
21	Text book of Physics B.Sc. II Sem-IV Paper-VII,	978-93-89343-48-9	Dr. R.R. Kothawale
22	Text book of Physics B.Sc. II Sem-IV, Paper-VIII,	978-93-89343-49-6	Dr. R.R. Kothawale
23	Handbook of practical Biochemistry	978-93-81528-27-3	Mr. D. S. Bhise
24	Handbook of practical Botany	978-93-81528-75-4	Dr. Gaikwad Mr. D. S. Bhise,
25	Text- Book of Botany B.Sc. I (CGPA)	978-93-81528-60-0	Mr. D. S. Bhise
26	Handbook of practical Botany	978-13-65250-64-4	Mr. D. S. Bhise
27	Text-Book of Botany	978-93-81528-31-0	Mr. D. S. Bhise
28	Handbook of practical Botany	978-93-81528-37-2	Mr. D. S. Bhise
29	Text- Book of Botany (CBCS pattern)	978-13-65621-40-6	Mr. D. S. Bhise
30	Text- Book of Botany Biostatistics	978-93-86766-82-3	Mr. D. S. Bhise
31	BiFeO ₃ thin films for electrochemical capacitor performance. (book chapter)	978-81-931247-6-5	Dr. S.D. Waghmare
32	Deposited ZnO thin films nanomaterial synthesis & application (book chapter)	978-81-925842-2-5	Dr. R.R. Kothawale
33	Text book of Physical chemistry B. Sc. I paper I	978-93-86766-16-8	Dr. V.M. Gurame
34	Text book of Analytical chemistry B. Sc. I paper IV	978-81-934102-9-5	Dr. V.M. Gurame
35	Text book of Physical chemistry B. Sc. II paper VII	978-93-86766-27-4	Dr. V.M. Gurame
36	Text book of Analytical chemistry B. Sc. III paper XII	978-93-86766-58-8	Dr. V.M. Gurame
37	Text book of Physical chemistry B. Sc. III paper IX	978-93-86766-57-1	Dr. V.M. Gurame
38	Text book of Physical chemistry B. Sc. III paper XIII	978-93-86766-77-9	Dr. V.M. Gurame

39	Text book of Physical chemistry B. Sc. I paper I	978-93-86766-16-8	Dr. V.M. Gurame
40	Text book of Analytical chemistry B. Sc. I paper IV	978-81-934102-9-5	Dr. V.M. Gurame
41	Text book of Physical chemistry B. Sc. II paper VII	978-93-86766-16-9	Dr. V.M. Gurame

c) List of patent

Sr. No.	Title of Patent	Inventor	Application No.	Journal No.	Office
1	Waterless Odourless urinal system	S.D. Deokar and etal.	1154/MUN/2010	24/2010	IPIRS
2	Vaginal Cream for controlling Microbial Infection	S.D. Deokar and etal.	2616/MUN/2011	46/2011	IPIRS

15. Give a list of Equipment, which are available and functional in the College costing Rs.5 lakhs and above.

Name of Equipment	Year of Purchase	Status
NIL		

16. Library facilities – List the Journals received in your College library in the concerned discipline

Sr.No.	Name of the Journal
1	Research & review: A Jol. of Physics
2	Nano trends: A Jol. of nano technology & its applications
3	Indian Jol. of pure & applied physics
4	Indian Jol. of biochemistry & biophysics
5	Physics for you
6	Indian Journal of chemistry Sec-A
7	Indian Journal of chemistry Sec-B
8	Indian Jol. of Biochemistry & Biophysics
9	Chemistry today
10	Research &review: A Jol. of Microbiology & virology
11	Indian Jol. of experimental biology
12	Research &review: A Jol. of Biotechnology
13	International Jol. of genetic engineering & recombination
14	International Jol. of fisheries & aquatic studies
15	Biology today
16	Electronics for you
17	Asian journal of Chemical Science

17. Details of Post-graduate Teaching and Research Profile & Plans of the College for next 5 years.

Details of Post-graduate Teaching in college:

The Shri Shivaji Mahavidyalaya Barshi, was established in 1960, run by Shri Shivaji Shikshan Prasarak Mandal Barshi founded by Karmveer Dr.Mamasaheb Jagdale.It is situated on the Pune-Latur state highway. The college is affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur and has been included **under 2(F) and 12(B) section** of the UGC.It aims at providing higher education and allround development of the students from the rural area. Its academic excellence is reflected its learning, teaching process in Arts and Science faculties.In arts faculty, college runs UG courses in Marathi, Hindi, English, Music, History, Political Science, Economics, Geography, Psychology, Physical education, Gymkhana and Sanskrit subjects and PG courses Marathi, Hindi, English, History, Political Science, Economicsand Geography subjects. In sciences faculty, the college runs UG courses in Physics, Electronics, Chemistry, Microbiology, Botany, Zoology, Mathematics and Statistics subjects and Post graduate courses in ***Physics, Chemistry, Microbiology, Botany and Zoology subjects***.

The college has regular 59 teaching staffs having high qualifications and 71 non-teaching staffs, and other teaching staffs on clock hour basis is more than 120. Presently, the student strength of the college is 2148. Its Student-Regular Teacher ratio is 36:1. Due to the kind co-operation and keen interest of the social workers, farmers and sincere efforts of the principals, teachers, students and non-teaching staff it achieved a good name among parents and people of Barshi and nearby area. The college has precious class rooms having all basic and digital facility like CCTV, LCD projector etc., attractive building, well equipped laboratories, well-furnished spacious playground, multipurpose gymnasium, central library with 95,000 books and 150 periodicals and journals, beautiful and green campus with boys and ladies hostels, central guest house, multipurpose halls, conference hall. The Library provides INFLIBNET online consortium and online access to the students and faculty members& researchers. The library also provides the news clippings service to library end-users.

The college has achieved number of milestones while starving towards excellence as follow.

- College has started two programmes, “food preservation” and “health care” under **Community College scheme** of UGC, New Delhi in the year 2013-14.
- The college is accredited in the 3rd cycle with ‘**A’ grade** with CGPA 3.14 by NAAC in year 2019.
- Punyashlok Ahilyadevi Holkar Solapur University, Solapur has verified **Academic & Administrative Audit (AAA)** of our college and secured the First rank (‘**A’ grade** with 91%) in the university.
- The college is selected for “**Star College**” under Star College Scheme run by Department of Biotechnology (DBT) in year 2017.
- In same year, the college is ranked in **ranking band 101-150** by National Institute Ranking Framework (NIRF).
- The National Service Scheme (NSS) unit of our college is awarded “**Best NSS Unit**” by State Government.
- The college is awarded with “**Best College Award**” by Punyashlok Ahilyadevi Holkar Solapur University, Solapur in the year 2018.
- Out of 14 youth festivals of Punyashlok Ahilyadevi Holkar Solapur University, Solapur, **the college has won the general championship eleven times** and runner ship one time.
- The college is awarded with “**Star College status**” under Star College status Scheme run by Department of Biotechnology (DBT) in year 2020.

Details of Research in college:

Moreover, the college is engaged in research work to a large extent, which is evident by the fact that some of the research laboratories are recognized and some are in process of getting recognition by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur. The faculties and Ph.D scholars do spend more time in laboratories and publish their research work in reputed journals. Therefore they have been received research funding from various

agencies. On other hand, the Departments and Staff members always step to collaborate with various external research agencies and Universities etc. So far we were able to make collaboration with more than ten external research agencies. These efforts have resulted in enhancement of teaching and research ideas. The college promotes research from under graduate level students through let them working on various projects, joining Avishkar and science competitions at national and state level. The college meanly focus on scientific thinking is reflected in the number of students presented papers in National and international seminars/workshops/conferences. The college shall continue to strive these efforts in the area of research in future with the help of financial support and guidance provided by various government scientific bodies. Therefore, our students actively participate and won prizes for college and individual.

In the today's highly competitive world, there is always a scope of improvement in the infrastructure and research facilities. Efforts need support of high end instruments to amalgamate the basic sciences to the high throughput technologies of applied branches. Our institute believes in interdisciplinary research with a goal of implementation of basic sciences to help the mankind. We have been striving these goals by researching in the areas of Synthesis of Nanomaterials using various methods like electrodeposition, Spay pyrolysis, Spin coating etc. for application of Solar cell energy, LPG and CO Gas sensors, Supercapacitor, Superconductivity, magnetic etc. applications. Our students have devised many useful devices such as, "Embedded Head Operated Computer Mouse" to help patients with restricted movement due to various disabilities, a cost effective device to control LPG cylinder leaks with alarm system, cost effective water field testing kits for drinking water etc. We would like to enhance our research abilities by providing better facilities and infrastructure to students to achieve high end goal of lab to land technologies.

Plans of the College for next 5 years:

We planned to extend our interdisciplinary research projects in the department of Physics, Chemistry, Microbiology, Botany, Zoology, Electronics, Mathematics and Statistics with the help of DST-FIST grants. Therefore, thirteen interdisciplinary research projects are proposed by faculty of different PG department in our college. It is decided that these projects will be undertaken to implement through this grant for five years. Finally, whatever results are come out, will be submitted for publication in internationally accepted journals.

Following projects will be conducted in DST-FIST grants.

Title of Project: 1.

Eco-Friendly Chemical Synthesis and Gas Sensors of Metal Oxide Nanostructures

Introduction: Due to elevated atmospheric pollution, effective and inexpensive systems for detection and quantification of environmentally hazardous gases are more important. Currently, standard air pollution measurements are still based on time-consuming and expensive analytical techniques such as optical spectroscopy and gas chromatography/spectroscopy. Gas sensors have been considered promising alternatives for environmental measurements due to their low cost, high sensitivity, fast response and direct electronic interface. However, their performances including accuracy, selectivity and reliability must be further improved to meet the requirements of standard air pollution measurement. It is also an important aspect in safety engineering, e.g. in oil and gas industry, power stations and chemical plants. Gas flows must be monitored and controlled, flammable, explosive or toxic gases must be detected by sensors to warn against hazardous concentrations. A very important dangerous toxic gas is carbon monoxide, because poisoning can be lethal and it does not have any odour, colour and taste, therefore, it is important to detect it in the low ppm range. Semiconducting metal oxide gas sensors are the best candidates due to their simple fabrication processes, low cost, small size, and high sensitivity. The operation of semiconducting metal oxide gas sensors is determined by means of the electrical properties of the sensing material. The conductivity of the sensing material changes dramatically upon surface adsorption and desorption of gas molecules.

In proposed work, eco-friendly chemical synthesis of metal oxide nanostructures and their implication in gas sensors application in carbon dioxide and liquid petroleum gas etc., will be carried out.

An overview of relevant literature: Metal-oxide gas sensors are of great interest since four decades. These resistive gas sensors are based on granular polycrystalline semiconducting metal oxide nanostructures. A wide range of reducing gases (e.g. CO, H₂, H₂S and hydrocarbons) and oxidizing gases (e.g. O₂, O₃, NH₃, Cl₂, NO, and NO₂) can be detected with these chemo resistors [1–5]. Various metal oxides such as SnO₂ [6], CuO/CuO₂ [7], TiO₂ [8], In₂O₃ [9], NiO [10], Co₃O₄ [11] and ZnO [12], so far, have been synthesized and they were used for automotive [13], indoor air quality control [14] and security [15]. In the present work other has been planned to develop a method that produce metal oxide nanostructures.

Furthermore, it is planned to study structural, electrical and morphological properties of these metal oxide nanostructures.

Aims and objectives

- ❖ The main objective is to extract metals and metal salts from fruits and vegetables which contain different metals.
- ❖ Use of extracted metals and metal salts for the synthesis of nano structured metal oxides using chemical method.
- ❖ To optimize process parameters such as temperature, concentration of chemicals and thickness of film and fabricate metal oxide thin film for gas sensors.
- ❖ To test synthesized metal oxide thin film for LPG, CO₂ and N₂ gases.
- ❖ To study structural, morphological, electronic, optical, electrical and gas sensing properties of thin film.

Research methodology: Over the past decades, several kinds of gas sensors have been developed based on different sensing materials and various transduction platforms. The main classes of gas sensing materials include metal oxide semiconductors, intrinsically conducting polymer, conducting polymer composite, metal-oxide/polymer composite and other novel materials. These materials can be applied on different transduction units including resistive, surface acoustic wave, quartz crystal microbalance, optical transducers and metal oxide semiconductor field effect transistor. Among these, resistive semiconducting metal oxide nanostructures are among the most potential candidates due to their very low cost, high sensitivity, fast response/recovery time, simple electronic interface, ease of use, low maintenance and ability to detect large number of gases. It is planned to extract metal and metal salts by using simple biological extraction technique. Supported metal and metal oxide nanoparticles will be synthesized by chemical method and their properties will be studied by different characterization techniques. A stepwise approach will be adopted to get metal and metal oxide nanoparticles by chemical method. Cleaning is an important step in case of thin film deposition. The substrate cleaning procedure will be optimized before deposition of metal oxide thin film. By choosing suitable metal salts, complexant and surfactant, a gel will be formed for the deposition of metal oxide thin films. Concentration of metal salt, complexant and surfactant will be optimized to get flat oxide film. Initial attempts will be made to standardize the process parameters to obtain crack-free, compact and uniform oxide thin films. It is well known that post annealing conditions significantly alter structure, phase and morphology of the as-deposited oxide film. Proper annealing condition (temperature, time and atmosphere) will be used to get desired phase of metal oxide films with improved

structure and morphology. The electrical, morphological and structural properties of the film will be characterized using available techniques such as SEM, TEM, FTIR, XRD etc., before use in gas sensor.

Plan of Research Work

Phase I

1. Literature survey
2. Purchase of various chemicals, glass wares and required equipments
3. Selection of different fruits and vegetables for extraction of metals and metal salts
4. Optimization of various process parameters of chemical methods
5. Deposition of films
6. Characterization by XRD, SEM, TEM, XPS, EDAX, etc

Phase II

1. Extraction of metals and metal salts by a simple biological extraction process
2. Optimization of concentration of metal salt, complexant and surfactant for the deposition of metal oxide thin films
3. Air baking at different temperatures for converting metals and metal salts in to metal oxide nanostructures
4. Characterization by XRD, SEM, TEM, XPS, EDAX, etc.
5. BET analysis for surface area and pore-size distribution analysis

Phase III

1. Use of these nanostructures in gas sensor application such as CO₂ and LPG.
2. Study of different gas sensing properties
3. Comparison with previously obtained results
4. Paper writing and submission
5. Drawing final conclusions
6. Thesis writing and submissions

References

- [1]. I. Simon, N. Barsan, M. Bauer, U. Weimar, *Sens. Actuators B: Chem.* 73 (2001) 1–26.
- [2]. H. Nanto, J. R. Stetter, , *Handbook of Machine Olfaction—Electronic Nose Technology*, Wiley-VCH, Darmstadt, Germany, 2003, pp. 79–104.
- [3]. J. W. Gardner, V. K. Varadan, O. O. Awadelkarim, *Microsensors MEMS and Smart Devices*, John Wiley & Sons Ltd, New York, USA, 2001.

- [4]. G. Eranna, B. C. Joshi, D. P. Runthala, R. P. Gupta, *Solid State Mater. Sci.* 29 (2004) 111–188.
- [5]. D. D. Lee, D. S. Lee, *IEEE Sens. J.* 1 (2001) 214–224.
- [6]. N. Yamazoe, J. Fuchigami, M. Kishikawa, T. Seiyama, *Surf. Sci.* 86 (1979) 335–344.
- [7]. P. Samarasekara, N. Kumara, N. Yapa, *J. Phys. Condens. Matter* 18 (2006) 2417.
- [8]. C. Garzella, E. Comini, E. Tempesti, C. Frigeri, G. Sberveglieri, *Sens. Actuators B* 68(2000) 189–196.
- [9]. A. Gurlo, M. Ivanovskaya, N. Barsan, M. Schweizer-Berberich, U. Weimar, W. Gopel, A. Dieguez, *Sens. Actuators B* 44 (1997) 327–333.
- [10]. I. Hotovy, V. Rehacek, P. Siciliano, S. Capone, L. Spiess, *Thin Solid Films* 418 (2002) 9–15.
- [11]. W. Li, L. Xu, J. Chen, *Adv. Funct. Mater.* 15 (2005) 851–857.
- [12]. J. Xu, Q. Pan, Y. Shun, Z. Tian, *Sens. Actuators B* 66 (2000) 277–279.
- [13]. L. Francioso, D. Presicce, A. Taurino, R. Rella, P. Siciliano, A. Ficarella, *Sens. Actuators B* 95 (2003) 66–72.
- [14]. H. Yamaura, K. Moriya, N. Miura, N. Yamazoe, *Sens. Actuators B* 65(2000) 39–41.
- [15]. D. Lee, H. Jung, J. Lim, M. Lee, S. Ban, J. Huh, D. Lee, *Sens. Actuators B* 71 (2000) 90–98.

Title of Project: 2.

Preparation and Characterization of Mn and Cu Doped Fe₂O₃ Thin Film Electrodes for Supercapacitor Application

Introduction: To survive the global energy crisis rechargeable energy storage devices like supercapacitors are important because of their low production cost, long-term durability, high energy and power density [2,3]. Super capacitors can also be called as ultracapacitors. They are considered as one of the most promising electrochemical energy storage devices having a potential to complement or eventually replace the batteries for energy storage applications i.e. those for wearable and portable electronic, electrical and hybrid vehicles. Supercapacitors are used in many industrial fields such as aviation, defense, medical transportation etc. Mainly these devices are being developed since they don't cause any environmental pollution like other hydrocarbon based electrical devices [6-8]. Because of their high specific power supercapacitors can be utilized in various applications such as satellite's, electric vehicles, robot devices[8-9]. Recently most effective technologies for energy conversion and storage are battery, fuel cell and supercapacitor. Among them supercapacitors are the promising candidate because of their high power density, reasonable energy density and longer life cycle [10,11]. Supercapacitors are classified on the basis energy storage mechanism as

- 1) Electrochemical double layer capacitor (EDLC)
- 2) Pseudo capacitor

Generally carbon based materials like activated carbon, carbon aerogels, graphene and carbon nanotube used in EDLC, while transition metal oxide like RuO₂, CuO, Ni(OH)₂, Co(OH)₂, MnO₂ etc. widely investigated in pseudo capacitors[12-17]. For EDLCs, the capacitance is originate from the accumulation of charges at the electrode-electrolyte interfaces. Therefore, controlling the specific surface area and pore size and enhancing electrical conductivity are the effective ways to achieve high storage capacity[7,8]. Also, the energy storage of pseudo capacitance is realized through transferring the faradic charges between electrolyte and electrode due to the reversible multi electron redox faradic reaction, which generally exhibit higher specific capacitance and energy density compared to EDLCs [10-12].

Energy Crisis: The energy crisis is a broad and complex topic. Most people don't feel connected to its reality unless the price of gas and fuel (petrol, diesel) at the pump goes up or there are lines at the gas station. The energy crisis is something that is ongoing and getting

worse, despite many efforts. The energy crisis is a result of many different strains on our natural resources, not just one[17,18]. There is a strain on fossil fuels such as oil, gas, and coal. Due to overconsumption natural resources become limited which then, in turn, can put a strain on our water and oxygen resources which causes pollution. Another cause of the crisis has been a steady increase in the world's population and its demands for fuel and products. Energy is produced by the burning of non-renewable fossil fuels[20]. This does not only affect the global resources of fossil fuels, but it also affects the environment. The burning of fossil fuels releases greenhouse gases like carbon dioxide and others[22].

Choice of topic with reasoning: To overcome the difficulty of energy crisis there is one great source of electric vehicles and supercapacitor is very important device for that. There are different methods for the preparation and characterization of Fe_2O_3 . Various transition metal oxides such as RuO_2 , Co_3O_4 , NiO , Fe_2O_3 , IrO_2 , SnO_2 , MnO_2 , etc., are being studied for the supercapacitor applications. Among these metal oxides for supercapacitor electrodes, amorphous hydrous RuO_2 is the most promising material for supercapacitors because of its high specific capacitance, excellent reversibility and long cycle life[16-18]. However, RuO_2 is expensive, toxic, and naturally less abundant, which limits their commercial use. Accordingly, there is a strong incentive to find alternative electrode materials, which are inexpensive and exhibit pseudocapacitance similar to that of amorphous RuO_2 [19-21].

Methods of synthesis and characterization: There are several synthesis methods while preparing nanomaterials for supercapacitor. Successive ionic layer adsorption and reaction (SILAR) method, sol-gel method, spray pyrolysis, chemical bath deposition method (CBD), chemical vapor deposition method (CVD), electrodeposition method can be used to synthesize the material. From the literature review the Successive Ionic Layer Adsorption and reaction method have been successfully employed to grow nanocrystalline Mn doped Fe_2O_3 thin films. Characterization of prepared material can be carried out with different characterization methods such as XRD (X ray diffraction pattern), transmission electron microscope (TEM), scanning electron microscope (SEM), Fourier transform infrared spectroscopy (FTIR), UV-visible spectroscopy etc.

Methodology:

- a) Preparation of Mn and Cu doped Fe_2O_3 .
- b) Samples will be optimized according to specific capacitance by cyclic voltammetry.
- c) Structural characterization of the optimized samples will be carried out using XRD.
- d) Morphological characterization of the optimized samples will be carried out using SE

M.

- e) For prepared electrodes compositional analysis will be carried using EDAX/XPS.
- f) The stability of prepared electrodes will be checked at different cycle variations.
- g) Electrochemical impedance will be carried to know the internal resistance associated with the electrode.
- h) Study will be carried out for symmetric and asymmetric devices prepared using different combination of electrodes.

References:

- [1]. B.E. Conway, Electrochemical Supercapacitors, Scientific Fundamentals and Technological Applications, Kluwer Academic/Plenum Press, New York, 1999.
- [2]. D.P. Dubal, D.S. Dhawale, R.R. Salunkhe, V.J. Fulari, C.D. Lokhande, J. Alloys Compd. 497 (2010) 166.
- [3]. K.W. Nam, K.B. Kim, J. Electrochem. Soc. 149 (2002) 346.
- [4]. C. Lin, J.A. Ritter, B.N. Popov, J. Electrochem. Soc. 145 (1998) 4097.
- [5]. H.Y. Lee, J.B. Goodenough, J. Solid State Chem. 148 (1999) 81.
- [6]. D.P. Dubal, D.S. Dhawale, R.R. Salunkhe, V.S. Jamdade, C.D. Lokhande, J. Alloys Compd. 492 (2010) 26.
- [7]. S. Duhan, S. Devi, Int. J. Electron. Eng. 2 (2010) 89.
- [8]. T. Maruyama, Y. Shinyashiki, Thin Solid Films 333 (1998) 203.
- [9]. N. Nagarajan, I. Zhitomirsky, J. Appl. Electrochem. 36 (2006) 1399.
- [10]. J.D. Desai, H.M. Pathan, S.K. Min, K.D. Jung, O.S. Joo, Appl. Surf. Sci. 252 (2005) 1870.
- [11]. H.M. Pathan, C.D. Lokhande, Bull. Mater. Sci. 27 (2004) 85.
- [12]. T.P. Gujar, V.R. Shinde, C.D. Lokhande, W.Y. Kim, K.D. Jung, O.S. Joo, Electrochem. Commun. 9 (2007) 504.
- [13]. S. Karuppuchamy, J.M. Jeong, J. Oleo Sci. 55 (2006) 263.
- [14]. V.R. Shinde, C.D. Lokhande, R.S. Mane, S.H. Han, Appl. Surf. Sci. 245 (2005) 407.
- [15]. R.D. Sun, A. Nakajima, A. Fujishima, T. Watanabe, K. Hashimoto, J. Phys. Chem. B 105 (2001) 1984.
- [16]. O. Bockman, T. Ostvold, G.A. Voyiatzis, G.N. Papatheodorou, Hydrometallurgy 55 (2000) 93.
- [17]. R.S. Mane, J. Chang, D. Ham, B.N. Pawar, T. Ganesh, B.W. Cho, J.K. Lee, S.H. Han, Curr. Appl. Phys. 9 (2009) 87.

- [18]. S. Patil, M.A. More, R.B. Gore, S.V. Rao, P.P. Patil, Mater. Sci. Eng. B 65 (1999) 145.
- [19]. T.P. Gujar, W. Kim, I. Puspitasari, K.D. Jung, O.S. Joo, Int. J. Electrochem. Sci. 22 (2007) 666.
- [20]. T. Brousse, D. Belanger, Electrochem. Solid State Lett. 6 (2003) A244.
- [21]. S.Y. Wang, K.C. Ho, S.L. Kuo, N.L. Wu, J. Electrochem. Soc. 153 (2006) A75.
- [22]. N.L. Wu, S.Y. Wang, C.Y. Han, D.S. Wu, L.R. Shiue, J. Power Sources 113 (2003)

Title of Project: 3.

Synthesis and Characterization of Nanocrystalline Copper Indium Gallium Diselenide Thin Films for Solar Cell Applications

Introduction: The industrialization, population and life style of the people in the world has increased the demand for the electricity rapidly and hence the production of electricity must increase to meet the demand. India is the third largest power producer and consumer of electricity [1,2]. The majority of electrical energy (about 79.8%) is produced by using the fossil fuel like Diesel, CNG, LPG and Coal and other form of renewable energy (about 17.3%) in India.[3] Though it is easy to produce electric energy from fossil fuel but has a major drawback's like limited reserve, pollute the air and emits the CO₂ and other greenhouse gases into the atmosphere. This leads for the scientists to go for alternative sources of electric energy such as Wind energy, Solar energy, Nuclear energy, Sea Tidal energy, Bio-mass energy etc.

Choice of topic with reasoning: The most easily available renewable energy in the nature is solar energy. It is frequently quoted that, "The solar radiation incident on the earth during the 90 minute would meet the world energy demand for one year." [4] The solar radiation of about 5,000 trillion kWh per year is incident over India's land mass, with average daily solar potential of 0.25 kWh/m². The solar energy is used in two ways as 1. Photothermal energy (light energy is converted into heat energy as used in solar heater and solar cooker) is an high efficient and low production cost but limited usage and 2. Photovoltaic energy (light energy is converted in to electrical energy) is an low efficient and high production cost but has a wide range of utilization.

The sunlight hitting on the earth surface contains electromagnetic waves with different frequencies combining photons of low energy (1.1 eV, infrared) to high energy (~ 3.5 eV, ultraviolet). The radiant energy falling in the range of visible spectrum with wavelengths between 400nm to 750 nm is about 46% of the total spectrum, 47% constitute infrared region and only 7% of it is in the ultraviolet region. The actual amount of solar energy reaching the earth surface after passing through the atmosphere varies with time, latitude and weather condition and is known as insolation (Incident solar radiation). When the sun is directly overhead i.e. perpendicular the earth surface, the insolation is typically 1000 W/m². Yet even with such huge potential, solar energy contribution is less than 0.1% to the world electric

energy production.[4]The major reason is the high production cost and complicated production processes.

An Overview of relevant Literature: There are three types of solar cell technologies available as 1. Silicon technology 2. Thin film technology and 3. Nano crystals/nanomaterial technology. The first generation PV technology uses crystalline silicon. The PV cell efficiency is about 20% and its market share is about 80% among PV technology. The major drawback of this technology is the cost of production and high material requirement as compared to other PV technology. The thin film PV technology is based up on the material CdTe (Cadmium Telluride), CIGS (Copper Indium Gallium Diselenide), a-Si TF(amorphous thin film Silicon) etc.

The recent PV technology also known as third generation PV technology are DSSC (Dye-Sensitized Solar Cell), OSC (Organic Solar Cell), PSC (Perovskite Solar Cell), QSC/QDSC (Quantum Dot Solar Cell), CPV (Concentrator Photovoltaic) etc. These types of PV cell are still under research. We are interested in the thin film PV technology as it requires less material, low cost, light weight and can be made flexible. The major research is ongoing in PV technology from last three decades. The CdTe PV cell is popular as its efficiency is higher among other TFPV cell but has an drawback as Cadmium is toxic material and it is an environmental concern.

The quaternary alloy Copper Indium Gallium Diselenium(CIGS) and related material in this Copper Chalcopyrite Material class are very well developed for the use in the PV cell technology. Its advantages are high absorption coefficient so that film thickness is very less (decreasing weight and material), mechanical flexibility, superior and variable optoelectronics, higher efficiency and lower cost. The high absorption is due to the direct energy bandgap material so it can absorb a significant portion of the solar spectrum. A Tunable band gap of ($\text{Cu}(\text{I}_{(1-x)}\text{Ga}_x)\text{Se}_2$) allows the possibility of Tandem CIGS PV cell design. The protective buffer layer improves the grain boundaries preventing surface recombination.

Methods of synthesis and characterization: The CIGS PV cell can be fabricated in One step, Two step and three step method. The deposition methods for thin films are broadly divided in to two groups as Vacuum based and solution based deposition. The vacuum based depositions are of two types as 1. Chemical Vapour Deposition (CVD) such as PECVD (Plasma Enhanced CVD), LPCVD (Low Pressure CVD), MOCVD (Metal organic CVD) and Physical Vapour Deposition such as Sputtering, Thermal Evaporation, Electron Beam Evaporation, Pulsed Laser Deposition..... etc. The major drawbacks of vacuum deposition are

1. Cost of deposition is high, 2. Requires sophisticated machinery and 3. Small deposition area. The solution based depositions are of two types as 1. Gas phase deposition such as CVD (Chemical Vapour Deposition), LCVD (Laser Chemical Vapour Deposition), PEVD (Plasma Enhanced Vapour Deposition) and Liquid phase deposition such as ED (Electro deposition), CBD (Chemical Bath Deposition), SILAR, Spin Coating, Spray pyrolysis, Sol-gel deposition, Anodisation, doctor Blade Deposition, etc. The solution based depositions are simple, low cost, room temperature deposition and can be deposited on large area. For the fabrication of CIGS thin film we prefer for the solution based deposition, like Chemical Bath Deposition, Spin Coating, spray pyrolysis deposition, SILAR.

The number of characterisation methods are to be used for the analysis of CIGS thin film PV cell such as its morphology, topography, its composition, thickness, grain size, surface smoothness, crystal structure, composition of film . etc. The XRD (X-Ray Diffraction) technique is used to determine the crystal type, the phases it contain and its crystallinity. Refinement of a measured diffractogram permits the determination of lattice parameters and quantitative analysis for structural faults and stress & strain within the crystal. XPS (X-Ray Photo electron Spectroscopy) and AES (Auger Electron Spectroscopy) are used for an accurate picture of chemical bonding, chemical composition and elemental position in thin film. UV-Vis-NIR Spectroscopy (Ultraviolet-Visible-Near infrared spectroscopy) is used to measure reflectance and transmittance. Raman Spectroscopy is used to study the composition, bonding, alloying and crystallinity. PL (photo luminescence) and PEC (Photo Electro Chemical) characterization technique enables to probe the optoelectronics properties and provides approximate solar cell efficiency without fabrication of complete cell.[5] FESEM (Field Emission Scanning Electron Microscopy) and AFM (Atomic Force Microscopy) are used for surface morphology and surface roughness of thin film. Hall measurement is used to measure the resistivity of thin film.

Solar cell Performance parameters: Solar cell performance can be analyzed by measuring four performance parameters i.e., open circuit voltage (V_{OC}), short circuit current density (J_{SC}), fill factor (FF) and efficiency (η). Open circuit voltage (V_{OC}) is the maximum voltage that is obtainable from a solar cell is the open circuit voltage (V_{OC}). Surface and bulk recombination's are main factors that retard V_{OC} of a solar cell. Short circuit current (I_{SC}) is the maximum current obtained from a solar cell when terminals of the solar cell are short-circuited. Short circuit current depends on a number of parameters like area of the solar cell, number of photons incident, optical properties of the material used for cell fabrication,

minority carrier lifetime etc. This is determined by the spectrum of incident light and area of the solar cell. Band gap of the material has critical role in determining J_{SC} of a solar cell. Material with higher band gap only absorbs less number of photons as compared to low band gap materials. Fill factor (FF) Fill determines quality of the solar cell. It is the ratio of maximum power (P_{MAX}) to the theoretical power (P_T). The theoretical power is product of open circuit voltage and short circuit current. Efficiency of the solar cell is the ratio of output energy to the energy input (light). The performance of different solar cells is compared by analyzing the efficiency of the solar cell. Cell efficiency depends on some external parameters like incident light spectrum and intensity and temperature at which measurement of the solar cell is done. Therefore, solar cell analysis is done at standard test condition (STC). The solar cell is analysed under AM1.5 conditions and temperature of 25 °C. Our research aim to use cost effective, simple deposition methods for the fabrication of CIGS PV cell to enhance the efficiency of solar cell.

Aims and objectives

- ❖ The main objective is to synthesis of Copper Indium Gallium Di-selenide using the Chemical bath deposition, spin coating and spray pyrolysis method.
- ❖ Next the synthesis of Copper Indium Gallium Di-selenide using spins coating method.
- ❖ Next the syntheses of Copper Indium Gallium Di-selenide using spray pyrolysis method.
- ❖ To test synthesized materials thin film solar cell application.
- ❖ To study structural, morphological, electronic, optical, electrical properties of thin film.

References

- [1]. Scenarios/ CO_2 emission/ India, International Energy Agency ,Retrived 8 march 2019 (Wikipedia.org)
- [2]. WWW.cea.nic.in, All India installed capacity of utility power station.
- [3]. Electricity generation (utility sector) by source of India FY 2018-2019+
- [4]. Ph.D. thesis by Helen J. Meadow, "Laser Annealing of CuInSe Electrodeposition Precursor as the Absorber Layer in Thin Film Solar Cell" University Du Luxemburg, PhD-FTSC-2014-47. P. 13.
- [5]. Ph.D. thesis by Mr. S.A. Arote SSPU, Pune, "Studies on factors influencing the performance of Tin Oxide based DSSS." Aug 2014.

- [6]. T. Kirchartz, K. Ding and U. Rau, "Fundamental electrical characterization of thin film solar cells." & D. Abou Ras, T. Kirchartz and U. Rau Editors," Advanced characterization technique for thin film solar cells." Wiley-VCH verlag GmbH & co. KgaA, 2011.

Title of Project: 4.

Electrochemical and Sol-gel synthesis of SnO₂ for Solar cell performance

Introduction: It is clear that access to economically viable renewable energy sources is essential for the development of a globally sustainable society. The mean global energy consumption rate was 13 TW in the year 2000. Assuming a kind of “business-as-usual” scenario with rather optimistic but reasonable assumptions of population growth and energy consumption, the projection is 28 TW in 2050 for the global energy demand [1,2]. Solar energy, beside fusion, has the largest potential to satisfy the future need by renewable energy sources [3]. From the 1.7×10^5 TW of solar energy that strikes the earth’s surface, a practical terrestrial global solar potential value is estimated to be about 600 TW. Thus, using 10% efficient solar farms, about 60 TW of power can be supplied. The Sun emits light with a range of wavelengths from the ultraviolet and visible to the infrared. It peaks in the visible, resembling the spectrum of blackbody at a temperature of 5760 °C.

The SnO₂ is a chemically stable oxide that has a conduction band edge E_c about 0.5 eV lower than of TiO₂ (anatase phase). It can therefore be used in conduction with dyes having low-lying LUMOs that inject poorly into TiO₂, such as some perylene sensitizers [4]. To-date reported efficiency for a dye sensitized SnO₂ Dye-sensitized solar cells (DSCS) is 2.8% for a cell sensitized with the organic dye D149 (N719 have 1.2% in the same study) [5]. In combination with the iodide/triiodide redox couple, the open circuit potential will be low in a SnO₂-based DSCS, at best 400 mV. A significant improvement in open circuit potential (V_{oc}) and efficiency can be obtained by covering the mesoporous SnO₂ with a very thin shell of another metal oxide, such as ZnO, MgO and Al₂O₃ [6-10]. Best efficiencies so far have been obtained using ZnO-coated SnO₂ with efficiencies up to 6.3% [8]. It is not certain that ZnO shell is formed in this case, the formation of a Zn₂SnO₄ shell is also possible. Zinc stannate (Zn₂SnO₄) is a chemically stable wide band gap material. In DSCS performance, efficiencies up to 3.8% were obtained for this material. Photo electrochemical characterization suggests that it has higher conduction band edge energy. Therefore metal oxide like TiO₂, ZnO and SnO₂ are under vast investigation to produce various morphologies so that they can be efficiently used in charge transportation developed by the dye molecule by absorbing the solar energy.

An Overview of Literature: Among the various methods of preparing nanostructured SnO₂, co-precipitation, Sol-gel, Spray-pyrolysis, hydrothermal routes, freeze-drying, etc., are popular. Recently, gel combustion routes using variety of organic fuels like urea, hydrazine, citric acid and others have been reported to be promising methods to prepare a variety of oxides including nanocrystalline SnO₂.

Aims and Objectives:

- ❖ The SnO₂ electrodes of different thickness using chemical methods will be prepared.
- ❖ Different inorganic chalcogenides SnO₂ and nanostructure film using chemical synthesis method such as CdS, ZnS and In₂S₃ will be used as sensitizers.
- ❖ These electrodes will be characterized using different sophisticated techniques including XRD, XPS, UV, SEM, TEM, FTIR etc.
- ❖ Different electrochemical equipment will be used to confirm the conduction and valence band levels.
- ❖ After chalcogenide electrodes will be sensitized in presence of inorganic nanoparticles such as CdS, ZnS and In₂S₃ and then again characterized using same techniques for knowing the presence and the influence on magnitude of light to solar cell performance.
- ❖ Finally, these CdS, In₂S₃ and embedded.

Synthesis methods: The Electrodeposition is a versatile and inexpensive technique used for the synthesis of nanomaterials from solutions at low temperature. This is based on controlled parameters like current or potential electrochemical deposition on an electrode from a solution the appropriate species, is therefore frequently used for the deposition of a wide range compounds including metals semiconductors, mixed metal oxides and magnetic nanolayered structures The electrodeposition technique is particularly well-suited for the deposition of single elements but it is also possible to carry out simultaneous depositions of several elements and synthesis of well-defined alternating layers of metals and oxides with thicknesses down to a few nanometers. Since, the microstructure of the deposited material can be controlled by adjusting parameters such as the deposition potential of the current density, the composition of the electrolyte or by employing various pulsed deposition techniques, electrochemical technique can offer a wide range of possibilities for tailor-made synthesis of materials with different properties.

Operating Principle: Electrodeposition method offers high corrosion protection, low cost and compliance with environment regulations. It is used for coating of articles of various sizes including steel building trusses, car bodies, furniture, appliances, toys etc. The current success of the electrodeposition is due to the water-dispersible, synthetics, electro-deposit

able micro-ions as film formers. The process is most frequently called electro-coating, though various names such as electro-painting etc. Electrodeposition combines many advantages of other painting methods with new and desirable features:

1. Water acts as continuous phase virtually eliminates the fire hazard and environmental pollution and reduces the cost of control equipment.
2. Low viscosity of the bath facilitates agitation and pumping and allows fast entry and drainage of work pieces.
3. Freshly deposited coats are composed of nearly 95% nonvolatile substances and therefore, allow immediate gentle handling; there is no tendency to sag or wash off during cure.
4. Overall savings, accounting for materials, labor, capital investment, energy etc. are 20-50% compared to spray, electrostatics spray or dip-coat painting.

On other hand, the Sol-gel route is very attractive because of relatively ease to perform and allow us to tailor the morphology of particle by relative rate of hydrolysis and combustion reactions. The cost of the precursors are used to synthesize nanomaterial decides the final cost of product.

Methodology: The Sol-gel and electrodeposition methods will be used for preparing SnO₂ electrodes. Some chemical active reagent will be used. Solar cell performance of the prepared SnO₂ electrodes with different thickness using the methods will be tested and then used as host electrodes for embedding CdS, ZnS and In₂S₃ nanoparticles whose details are presented in report.

Phases of the work:

Phase I

1. In first six months, Literature survey will be undertaken to understand reaction kinetics of SnO₂ formation.
2. Actual deposition of SnO₂ electrodes of different thickness will be carried out in the next six months using Sol-Gel method.
3. This time will be mainly utilized in structural, optical, electrical characterization of SnO₂ electrodes analysis.
4. Efforts will also be taken to study elemental stoichiometry using energy-dispersive X-ray analysis, Raman shift, selected area electron diffraction etc.

Phase II

1. In first six month in second year, literature survey will be undertaken to understand reaction kinematics of SnO₂ formation

2. Actual deposition of SnO₂ electrodes of different thickness will be carried out in the next six months using Electrodeposition method.
3. This time will be mainly utilized in structural, optical, electrical characterization of SnO₂ electrodes analysis.
4. Efforts will also be taken to study elemental stoichiometry using energy-dispersive X-ray analysis, Raman shift, selected area electron diffraction etc

Phase III

1. In this phase, both SnO₂ electrodes will be used as host electrodes for embedding CdS nanoparticles for maximum performance and characterization will be carried out.
2. After optimizing thickness, embedding time of CdS nanoparticles for maximum performance will be tested and then again will be characterized using XRD, EDX, XPS, FTIR, UV, SEM, TEM, IPEC etc will be carried out.

Phase IV

1. In this phase, these electrodes will be used as host electrodes for embedding other nanomaterials such as ZnS and In₂S₃ for fixed time and then characterization will be repeated.
2. After optimizing thickness, dipping times will be varied and then characterization such as XRD, EDX, XPS, FTIR, UV, SEM, TEM, IPEC etc. will be carried out.
3. Writing research paper and report will be done.

References

- [1]. Service R.F, Science 2005, 309, 548.
- [2]. Potocnik J. Science 2007. 315, 810.
- [3]. Schiermeier Q, Tollefson J, Scully T, Witze A, Morton O. Nature 2008, 454, 816.
- [4]. Ferrer,A, Zaban A, Gregg BA. J. Phys. Chem. B 1997, 101, 490.
- [5]. Onwona-Agyeman B, Kaneko S, Kumara A, Okuya M, Murakami K, Konno A, Tennakone K.Kpn. J Appl. Phys.-2 2005, 44, L731.
- [6]. Tennakone K, Kumara A, Kottegoda IR, Perera VP. Chem Commun. 1999, 15.
- [7]. Kumara G.R., Tennakone K, Perera VP, Konno A, Kaneko S, Okuya MJ. Phys. D Appl. 2001, 34, 868.
- [8]. Kay A., Gratzel M. Chem. Mater. 2002, 14, 2930.
- [9]. Ito S, Makari Y, Kitamura T, Wada Y. Yanagida S. J. Mater. Chem. 2004, 14, 385.

Title of Project: 5.

Synthesis of carbon nanowire treated Bismuth Ferrite for Electrochemical capacitor performance

In this research work, it is planned to synthesize carbon nanowire treated bismuth iron oxide known as C-bismuth ferrite (C-BFO), nanostructures by using a simple and cost-effective sol-gel and hydrothermal methods in the form thick film. The prepared thin films will be tested for electrochemical capacitor performance. Then other characterization will be done to verify its structure, morphology, functional group etc. by using SEM, TEM, EPS UV, FTIR, contact angle, binding energy etc. Finally, Results will be published in internationally accepted journals.

Aims and Objectives: The aim of this research project is to develop high performance electrochemical capacitor using the materials pure and Carbon nanowire treated bismuth ferrite. To investigate the feasibility of the proposed research, the following objectives outline the aspects considered in this project.

- ❖ Synthesis of Carbon nanowire treated bismuth ferrite as key materials for electrochemical capacitor (for at least three electrolytes).
- ❖ Understanding their operation principles and investigating the relevant mechanisms that affect their performances.
- ❖ Characterizing these developed pristine and mixed nanostructures by means of their crystal structure, stoichiometricness and structural impurities, if there is any, using various techniques.
- ❖ Fabricating electrochemical capacitors.
- ❖ Investigating the performances of these devices and assessing them with standard benchmarks, to explain the basis of the enhancements of their performances.

Phases of the proposed research work:

Phase I

1. First of all, the detailed literature survey will be undertaken for the proposed research work.
2. Preparation of pure bismuth ferrite nanostructures by Sol-gel and hydrothermal methods.
3. Characterization of these films will be undertaken using different techniques.

4. Electrochemical capacitors will be fabricated using these films in different electrolyte medium.

Phase II

1. Prepared material will be treated by carbon nanowire.
2. Different structural, morphological characteristics will be undertaken using different instruments.
3. Effect of treated carbon nanowire on electrochemical capacitor of bismuth ferrite will be investigated.

Phase III

1. Proposed research work will be submitted in the form of report comprising in different chapters.
2. Research papers in internationally accepted journals will be submitted for publication

Title of Project: 6.

Biological Study of Metal Complexes Derived From Mercapto Triazole Schiff Bases

Introduction: Hugo Schiff discovered Schiff base in 1864. It is prepared from condensation reaction between primary amine and carbonyl compound (1). This compound is also known as anils, imines or azomethines, with general formula $RHC=NR_1$. The 'N' atom in azomethine group is sp^2 hybridized, containing lone pair of electron because of this azomethine group have chemical and biological importance. The Schiff bases are best chelating agent, when Schiff base derivatives contain -OH or -SH functional group near to azomethine group, it forms a five or six member chelate ring with metal ion (2). Schiff base metal complexes with Ni(II), Cu(II), Zn(II) etc. shows anticancer activity (3).

Now a days in the research field 'N' bridged heterocycles derived from 1,2,4 triazole group have initially stir up the researcher's because of their biological activities and industrial intermediate. The compound containing triazole nucleus shows antiviral activity(4). The 1,2,4-triazole derivatives shows antitubercular (5), Anticancer(6,7), anticonvulsant(8) anti-inflammatory and analgesic properties(9).

The literature survey reveals that there is enough scope to study the solid state metal complexes with respect to their synthesis characterization and biological activity. Therefore we motivated to undertake a research scheme as, "Biological Study of Metal Complexes Derived from Mercapto Triazole Schiff Bases"

Brief Review of Literature: Schiff base metal complexes play an important role in chemical industry as well as in our day to day life. Chemistry of complex formation is presently attracting attention of researchers from diverse discipline progress. This area of chemistry has received an impetus because of its wide application to analytical, synthetic, organic chemistry, biology and medicine. S A Deodware(10,11) synthesized various mercapto-1,2,4-triazole derivatives and their metal complexes, exhibits excellent antimicrobial and anticancer activity. Guo-wei (12) and his coworker synthesized 4-amino-1,2,4-triazole Schiff base derivative and evaluate its antitumor activity. The anticancer effect of 4-amino-1,2,4-triazole Schiff base derivative was evaluated by MTT [3-(4,5-dimethylthiazol-2-yl) -2,5-diphenyltetrazolium bromide] assay on a lung adenocarcinoma cell line (A549) and a human hepatoma cell line (Bel7402). A H Manikshete et al(13) synthesized new Schiff base ligand by condensation of benzoin with 2-amino benzoic acid and its Co(II), Ni(II), Cu(II) complexes. All the compounds were characterized by UV-Visible, IR, 1H NMR spectroscopy,

thermal studies and magnetic susceptibility measurement. The ligand and metal (II) complexes were screened for antimicrobial and antifungal activity. H M Vinusha(14) and his coworker synthesized 4-(((5-mercapto-4H-1,2,4-triazol-3-yl)imino)methyl)-2-methoxyphenol(L) and its Cu(II), Co(II), Mn(II), Ni(II) and Zn(II) complexes. The Schiff base ligand and their complexes were assessed for their in vitro antibacterial activity against nine food pathogens. The complexes exhibited higher antibacterial effects than the corresponding ligand. Among the complexes tested for antibacterial activity, Zn complex was found to be potential compound. M. Ahmed (15) synthesized triazole-containing amino acid derivatives under green chemistry conditions via multi component reaction using lemon juice as an acidic catalyst. They were evaluated for their in vitro anti leishmanial activity against miltefosine and amphotericin B deoxycholate as reference drugs. In addition, in silico predictions revealed that these compounds exhibited promising drug-likeness and pharmacokinetics profile. Rachana Joshi(16) synthesized New triorganotin (IV) complexes of Schiff base (E)-4-amino-3-(2-(4-hydroxybenzylidene)hydrazinyl)-1H-1,2,4-triazole-5(4H)-thione (HL) with general formula R_3SnL (where L is the mono anion of Schiff base (HL) and $R = n\text{-Bu(1)}/\text{Ph(2)}$). It shows antifungal activity.

Research Problem:

By considering the literature survey the research problem is planned to carry out as under,

- a. Synthesis of ligands and their metal complexes.
- b. Elemental and spectral analysis:
The ligands and their metal complexes will be well characterized by elemental analysis, spectral (UV-Visible, IR, NMR) analysis, thermal analysis, XRD analysis.
- c. Determine the structure of the complexes.
- d. Testing of biological activity.

Newly synthesized ligands and metal complexes will be screened to evaluate the antibacterial, antifungal, anticancer, antioxidant, DNA cleavage, antipyretic anti-inflammatory etc. activities.

Significance of Research Work: The mercapto triazole Schiff base contains O, N and S electron donor atoms so, they form five or six member chelate ring with metal ion. Chelation can causes drastic change in biological behavior both due metal and ligand. This stimulated us to work on synthesis of biologically active metal complexes containing biologically active groups. Two biological active nitrogen and sulphur containing moieties like 1,2,4-triazole and

Schiff base (Azomethine group) present together. Resourcefulness maracpto triazole ligands having biological, analytical and industrial applications (17-24) of their complexes make a further investigation in this area is highly desirable.

Hypothesis: In view of above literature it is evident that the compounds derived from Marcapto Triazole Schiff Bases and their metal complexes showed wide range of properties of interest. Hence it is worth to study metal complexes of ligands derived from mercapto 1,2,4-triazole Schiff bases.

Objectives:

- ❖ To synthesize chelating ligands derived from substituted aromatic amines and their metal complexes.
- ❖ To characterize the synthesized compounds by spectral analysis (UV-Visible, IR, ^1H NMR, XRD etc.), thermal analysis and magnetic susceptibility measurement.
- ❖ To evaluate the antibacterial, antifungal, anticancer, antioxidant, DNA cleavage, antipyretic anti-inflammatory etc, activities.

Methodology/Laboratory: By using the available literature, ligands and their metal complexes will be prepared. The characterizations of synthesized compounds will be carried out by advanced techniques such as IR, NMR, UV-Visible, XRD, TGA-DTA, DFT etc. Biological and pharmacological activities of the ligands and their metal complexes will be studied as per the reported methods.

Outline of Proposed Research Work:

First year:-

- a) Ist six months: Detail referencing work related research area.
- b) IInd six months: Synthesis of ligands by using best suitable reported or new methods.

Second year:-

- a) Ist six months: Synthesis of metal complexes by routine and new methods.
- b) IInd six months: Characterization of synthesized compounds with available resources.

Third year:-

- a) Ist six months: To study biological activities and publications of research work
- b) IInd six months: Writing of research report.

References

- [1]. H. Schiff, Ann. Suppl., 1864, 3, 343

- [2]. J Nandi, VK Sankar. Synthesis and docking of the schiff base derived from 4-aminopyridine. *J Pharm Sci Innovation.*, 2012. p. 9-11.
- [3]. N Raman, JD Raja, A Sakthivel. Synthesis, spectral characterization of Schiff base transition metal complexes: DNA cleavage and antimicrobial activity studies. *J Chem Sci* 2007, 119, 303–10
- [4]. K. Masuda, T. Toga, *Chem Abstr.*, 1976, 84, 12173
- [5]. K. Walczak, A Gondela, J. Suwinski, *Eur J. Med. Chem.*, 2004, 39, 849-853
- [6]. B. S. Holla, K. N. Poojary, B. S. Rao, M. K. Shivananda, *Eur J. Med. Chem.*, 2002, 37, 511-517
- [7]. B. S. Holla, B. Veerendra, M. K. Shivananda, B. Poojary, *Eur, J. Med. Chem.*, 2003, 38, 759-767
- [8]. M. Amir, K. Shikha, *Eur J. Med chem.*, 2004, 39, 535-545
- [9]. Almasirad, S. A. Tabatabai, M. Faizi, A. Kebriaeezadeh, N Mehrabi, A Dalvandi, A. Shafiee, *Bioorg. Med. Chem. Lett.*, 2004, 14, 6057-6059
- [10]. S.A. Deodware, S H Gaikwad *Der Pharma Chemica*, 2015, 7(7), 365-372
- [11]. S.A. Deodware, D G Sathe, T N Lokhande and S H Gaikwad, *Arabian Journal of Chemistry.*, 2017, 10, 262–272
- [12]. Guo-wei Jiang, Qing Chang, Dong-yu Liang, Yu-ting Zhang, Yong-jun Meng¹ and Qing-qing Y, *Journal of International Medical Research*, 2020, 48(2), 1–10
- [13]. A.H. Manikshete, S. K. Sarsamkar, S. A. Deodware, V. N. Kamble, M.R. Asabe, *Inorg. Chem. Comm.*, 2011, 14, 618.
- [14]. H.M. Vinusha , Shiva Prasad Kollur , H.D. Revanasiddappa , Ramith Ramu , Prithvi S. Shirahatti , M.N. Nagendra Prasad , S. Chandrashekar, Muneera Begum, *Results in Chemistry*, 2019, 1, 100012
- [15]. M Ahmed. El-Saghier, A Mounier. Mohamed, A M Omya. Abd-Allah, Asmaa. Kadry, M Tamer. Ibrahim & A Adnan. Bekhit *Medicinal Chemistry Research.*, 2019, 28, 169–181
- [16]. Rachana Joshi, Ankita Kumari, Karuna Singh, Hirdyesh Mishra, Sandeep Pokharia doi.org/10.1016/j.molstruc.2019.127639
- [17]. S H Gaikwad, M A anuse, *Chem, Environ. Res*, 2005, 13, 285
- [18]. S H Gaikwad, M A Anuse, *Ind J Chem(A)*, 2005, 44, 1625
- [19]. A B Shaikh, S H Gaikwad, *S. Afr. J. Chem.*, 2016, 69, 157
- [20]. A B Shaikh, S H Gaikwad, *Rasayan J. Chemistry*, 2017, 10, 967

- [21]. U B Barache, A B Shaikh, S H Gaikwad, *J. of Environ. Chem. Engin.* 2017, 5, 4828
- [22]. U B Barache S H Gaikwad, *Spectrochem. Acta Part A:*. 2018, 189,443
- [23]. M R Kate, S H Gaikwad, *Rasayan J. Chemistry*, 2018, 11, 1441
- [24]. U B Barache, A B Shaikh, S H Gaikwad, *GSD*, 2019, 9, 100221.

Title of Project: 7.

Studies of Some Rare Earth Metal Schiff Base Complexes: Synthesis, Characterization and Biological Activities

Introduction: Among the coordination compounds the transition metal complexes of Schiff bases have been studied extensively due to the synthetic flexibility of Schiff bases and their selectivity as well as sensitivity towards the central metal atom. A number of reviews have been devoted to coordination chemistry of Schiff base metal complexes. Azomethines are generally known as Schiff bases to honour Hugo Schiff, who synthesized such compounds. Hugo Schiff described the condensation reaction between an aldehyde and amine leading to the formation of Schiff base in 1864[1]. Several methods have reported for the preparation of azomethine. The chelating structures, moderate electron donation and easy tunable electronic and steric effects proved Schiff bases as versatile ligands capable of stabilizing different metals in various oxidation states with unusual structural features and controlling the performance of metals in variety of useful catalytic transformations [2-4]. Schiff bases can be synthesized from an aromatic amine and a carbonyl compound by nucleophilic addition forming a hemiaminal, followed by a dehydration to generate an imine [5] they are well known intermediates for the preparation of azetidiones, thiazolidinones, oxadiazolines and many other derivatives. It has been suggested that the azomethine linkage is responsible for the biological activities of Schiff bases such as antimicrobial [6-9], antiparasitic [10], antifungal [8,9,11], antitumor [12-14] anticancer [15], anti-inflammatory [16] and as herbicidal [17]. It is observed that the biological activity of ligands enhances on complexation [18-21]. Pyrimidine derivatives are used for thyroid drugs and leukemia. The solid Schiff base complexes of trivalent cobalt used as antiviral agent has also been reported in view of labile axial ligands which exhibit higher activities, possibly due to axial binding of cobalt ion to biological targets (proteins and nucleic acids) [22]. It has been observed that most of the metals make 1:1 metal complexes with Schiff bases [23]. Chemists over a period of years reported the binding of cationic metal complexes with DNA [24-26]. The factors that determine the affinity and selectivity in binding of small molecule to DNA would be valuable in rational design of new diagnostic and therapeutic agents [27-29], thus the metal complexes binding to DNA through a variety of modes may be exploited in probe development. These metal complexes are known to bind to DNA through a series of interactions, such as π stacking interaction associated with interaction of aromatic heterocyclic groups between the

base pairs, hydrogen bonding and Van der Waals interactions in the case of binding to the groove of DNA helix [30].

The literature survey showed that there is enough scope to study the solid state metal complexes with respect to their synthesis characterization and biological activity. Therefore we desire to undertake a research scheme as, *Studies of some rare earth metal Schiff base complexes: Synthesis, characterization and Biological activities*

Research Problem:

By considering the literature survey the research problem is planned to carry out as under,

1. Synthesis of Schiff bases and their rare earth metal complexes.
2. Elemental and spectral analysis:

The ligands and their metal complexes will be characterized by elemental analysis, spectral (UV-Visible, IR, NMR) analysis, thermal analysis, XRD analysis.

3. Determine the structure of the complexes.
4. Testing of biological activity:

Newly synthesized ligands and metal complexes will be screened to evaluate the antibacterial and antifungal activities.

Significance of Research Work: Schiff bases have strong ability to form metal complexes and hence it deserves the typical attention because of biological property. The presence of a lone pair of electrons in sp^2 hybridized orbital of nitrogen atom of the pyrimidine group is of considerable chemical and biological importance. Because of the relative easiness of preparation, synthetic flexibility, and the special property of $>C=N-$ group, Schiff bases are generally excellent chelating agents, especially when a functional group like $-SH$ is present close to the pyrimidine group so as to form a five or six member ring [31-37] with the metal ion. Versatility of Schiff base ligands and biological, analytical and industrial applications of their complexes make further investigations in this area highly desirable.

Brief Review of Literature: Extension work has been done on metal complexes with organic ligands in mixed (Ethanol-water, methanol-water and dioxane-water etc.) solvent. Schiff base metal complexes play an important role in chemical industry as well as in our day to day life. Chemistry of complex formation is presently attracting attention of researchers from diverse discipline progress. This area of chemistry has received an impetus because of its wide application to analytical, synthetic, organic chemistry, biology and medicine.

Benzothiazolpyrimidine-3-carboxylate has been synthesized as potential anticancer compounds. These compounds were prepared from 2-aminobenzothiazole, benzaldehyde and ethyl acetoacetate in ethylene glycol by catalyzing with TBAHS to give benzothiazopyrimidine derivative followed by the formation of amide by reaction with several secondary amines in good yields. The cytotoxicity of these compounds was evaluated against human cancer cell lines *in vitro* [38]. Selvan et al. [39] have prepared sulfonamide and its derivatives as anti-HIV agent. D. Arish et al. [40] reported the Schiff base ligand, pyrrol-L-histidinate(L) and its Co(II), Ni(II), Cu(II) and Zn(II) complexes. These compounds were synthesized and characterized by elemental analysis, mass, molar conductance, IR, electronic, magnetic measurements, EPR, redox properties, thermal studies, XRD and SEM. The *in vitro* biological screening effects of the synthesized compounds were tested against the bacterial species and fungal species.

More et al. [41] have marked the biological activity of Schiff bases synthesized from Aminothiazoles. Lagorce J.F et al. [42] synthesized various derivatives of pyrimidine or pyrazine to thiazole-2-thiol or to its partially hydrogenated derivative 2-thiazoline-2-thiol. The reactions of the compounds with molecular iodine and lactoperoxidase were examined *in vitro*. Their antithyroid activity was also examined *in vivo* in the rat. T4 and TSH levels were determined, and the thyroid gland was examined histologically. 2-(3-Hydroxy-2-pyridyl)-2-thiothiazoline had the highest antithyroid activity of the compounds tested ($K_c = 14931 \text{ mol}^{-1}$), $IC_{50} = 0.65 \times 10^{-4} \text{ M}$, activity of thyroid gland. Yogesh Kumar Gupta [43] and co-workers focused on the reactions, synthesis, spectral analysis and Microbial activities of Pyrimidine based benzothiazole derivatives. The method gives excellent than previously reported literature. Some of the compounds were effective as antimicrobial and antifungal agents. S.H. Gaikwad [44] worked on Pyrimidine-2-thiols. These are reported as good analytical reagent for the spectrophotometric determination of metal ions. They use 1-amino-4,4,6-trimethyl(1H,4H) pyrimidine-2-thiol(1-aminoTPT) as an analytical reagent for extractive spectrophotometric determination of bismuth (III). A.H. Manikshete et al. [45] synthesized new Schiff base ligand by condensation of benzoin with 2-amino benzoic acid and its Co(II), Ni(II), Cu(II) complexes. All the compounds were characterized by UV-Visible, IR, ^1H NMR spectroscopy, thermal studies and magnetic susceptibility measurement. The ligand and metal (II) complexes were screened for antimicrobial and antifungal activity. Ernst Bayer [46] has reported some metallocomplex Schiff bases derived from o-amino phenol. O.A. Fathalla et al. [47] synthesized some new pyrimidine derivatives. 4-Oxo-2-thioxo-1,2,3,4-

tetrahydropyrimidine(2-thiouracil) is reacted with a series of diazotized amines to give products which shows some cytotoxic activity in addition to antibacterial activity. Vishwas D. Suryawanshi et al. [48] worked on Steady state fluorescence and UV–vis absorption spectroscopic techniques which have been exploited to explore the binding interaction of an antibacterial pyrimidine derivative 2-amino-6-hydroxy-4-(4-hydroxyphenyl)-pyrimidine-5-carbonitrile (AHHPPC) with the model transporter protein, human serum albumin (HSA) under the physiological conditions. It exhibits antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*.

Nemat M.Hassen et al. [49] studied the efficacy of Pyrimidine derivative. The pyrimidine derivative (4,6-dimethyl-N-phenyldiethyl pyrimidine, DPDP) was tested as a foliar spray fungicide at 50 mg L⁻¹ for protection of eggplant (*Solanum melongena*) from spot disease caused by *Alternaria alternata*. *Alternata* growth in vitro; the magnitude of inhibition increased with increasing concentration. Alagarsami and co-authors [50] reported the synthesis of 2-mercapto-3-substituted-5,6-dimethylthieno[2,3-d]pyrimidine-4(3H)-ones by condensation of amino group of 3-amino-2-mercaptothienopyrimidine with different aldehydes and ketons. Coordination chemistry of lanthanide has become of increasing significance in the last few years due to the wide variety of applications of lanthanide complexes in supramolecular photochemistry and in medicine [51, 52]. Co-ordination compounds of the lanthanides are frequently used as catalysts, which is demonstrated by the work of [53, 54].

One of the oxygen heterocyclic compounds 3-acetyl-6-methyl-2H-pyran 2,4(3H)-dione (DHA) was reported to be an excellent chelating agent and possesses promising fungicidal, bactericidal, herbicidal and insecticidal activities. It is also a versatile starting material for the synthesis of a wide variety of heterocyclic ring systems [55- 57].

Hypothesis: By considering above literature it is evident that the Schiff's bases are rarely derived from Pyrimidine thiols / sulfone dianiline. These Schiff's bases are biologically active and their rare earth metal complexes have wide range of properties of interest. Hence it is worth to study rare earth metal complexes of ligands derived from pyrimidine thiols / sulfone dianiline.

Aim and Objectives:

- ❖ To synthesize chelating ligands derived from pyrimidine thiols or sulfone dianiline and aromatic substituted aldehyde and their rare earth metal complexes of La(III), Ce(III), Nd(III) and Sm(III) etc.

- ❖ To characterize the synthesized compounds by spectral analysis (UV-Visible, IR, ¹H NMR, XRD etc.), thermal analysis and magnetic susceptibility measurement.
- ❖ To evaluate the antibacterial activities against few Gram +ve bacteria such as staphylococcus aureus and Basillus sp. etc. and Gram –ve bacteria such as pseudomonas aeruginosa and Escherichia coil etc. and antifungal activities against Aspergillus niger and fusarium sp.etc.

Methodology/Laboratory: By using the literature, ligands and their metal complexes will be prepared. The characterizations of synthesized compounds will be carried out by advanced techniques such as IR, NMR, UV-Visible, XRD, TGA etc. Biological activities of the ligands and their metal complexes will be studied as per the reported methods.

Outline of Proposed Research Work:

First year: -

- a) Ist six months : Referencing
- b) IInd six months: Synthesis of ligand

Second year:-

- a) Ist six months: Synthesis of metal complexes
- b) IInd six months: Characterization of synthesized compounds

Third year:-

- a) Ist six months: To study biological activities and publications of research work
- b) IInd six months: Writing of research report .

References

- [1]. H. Schiff, Ann.Suppl., 1864, 3, 343.
- [2]. P.G. Cozzi, Chem. Soc. Rev., 2004, 33, 410.
- [3]. H. Makio, N. Kashiva, T. Fujita, Adv, Synth. Catal., 2002, 344, 477.
- [4]. R.T. Ruck, E.N. Jacobsen, Angew. Chem. Int. Ed., 2003, 42, 4471.
- [5]. Amanda ,J Gallant;Brian O Patrick;Mark J MacLachlan; Org Chem.,2004,69(25),873 9.
- [6]. P.G. More, R.B. Bhalvankar and S.C. Pattar, J. Indian Chem. Soc., 2001, 7H, 474.
- [7]. A. H. El. Masry, H.H. Fahrny and S.H.A. Abdelwahed, Molecules, 2000, 5, 1429.
- [8]. M.A. Baseer, V.D. Jadhav, R.M. Phule, Y.V. Archana and Y.B. Vibhute, Oriental J. Chem., 2000, 16, 553
- [9]. S.N. Pandeya, D. Sriram, G. Nath and DeClercq, E. Farmaco, 1999, 54, 674 .
- [10]. Rathelot,P.;Azas,N.;El-Kashef,H.;Delmas,F. Eur J Med Chem.,2002,37(8),.

- [11]. W.M. Singh and B.C. Dash, *Pesticides*, 1988, 22, 33.
- [12]. E.M. Hondett and W.J. Dunn, *J. Med. Chem.*, 1971, 13, 768.
- [13]. S.B. Desai, P.B. Desai and K.R. Desai, *Hetrocycl. Commun.* 2001, 7, 83.
- [14]. P. Pathak, V.S. Jolly and K.P. Sharma, *Orient. J. Chem.*, 2000, 16, 161.
- [15]. Holl;B.S.;Veerendra,B.;Shivananda M.K.; Poojary,B.*Eur JMed Chem.*,2003,38(7)759
- [16]. Holl;B.S.; Malini.K.V.; Rao,B.S.; Sarojini,B.S.; Kumari,N.S. *EuJ MedChem.*,2003,38 (7), 313
- [17]. S. Samadhiya and A. Halve, *Orient. J. Chem.*, 2001, 17,119
- [18]. N.M. Samus, E.N. Shlyakhar, N.G. Yelishko, T.A. Burdenko, T.S. Chaika. I. Tasapk ov, V.G. Bodyu and S.P. Borozenets, *khlim-Farm.Zh*, 1989, 23, 1098.
- [19]. W. Zhong, W. Zishen, V. Zhenhuan and Quinghua, *Transition Met. Chem.*, 1994, 19, 235.
- [20]. K.H. Reddy and Y. Lingappa, *Ind. J. Chem.*, 1994, 33A, 919.
- [21]. C.B. Hussain and P. Humayan, *Synth. React. Inorg. Met.-Org. Chem.*, 1993, 23, 1061
- .
- [22]. A. Bottocher, T. Takeuchi, M.I. Simon, T.J. Meade, H.B. Gray, *Inorg. Biochem.*, 199 5, 59, 221.
- [23]. H. Kim, H.K. Lee, A.Y. Choi, S. Jeon, *Bull. Korian Chem. Soc.*, 2007, 28, 538
- [24]. J.K. Barton, *Comments Inorg.Chem.*, 1985, 3, 321
- [25]. P. G.Schultz, J.S. Taylor, P.B. Darvan, *J. Am. Chem. Soc.*, 1982, 104, 6861.
- [26]. S. J. Lippard, *Science*, 1982, 218, 1075 .
- [27]. A. M. Pyle, J.K. Barton, *Prog. Inorg. Chem.*, 1990, 38, 413 .
- [28]. D. S. Sigman, *Acc. Chem. Res.*,1986, 19, 180.
- [29]. J. M. Kelly, A.B. Tossy, D.J. Mc Connel, C.OhUigin, *Nucleic Acids Res.*,1985, 13, 6 017.
- [30]. R.Vijayalakshmi, M. Knthimathi, V. Subramanian, B.U.Nair, *Biochimica et Biophysica Acta*, 2000, 1475, 157.
- [31]. P.singh,R.L.Goel,B.P.Singh,*J.IndianChem.Soc.*,1975,52,958.
- [32]. B.F.Perry,A.E.Beezer, R.J.Miles, B.W.Smith, J.Miller, M.G.Nascimento, *Microibios.*, 1988,181.
- [33]. A.Elmali,M.Kabak,Y.Elerman,*J.Mol.Struct.*,2000,477,151.
- [34]. P.R.Patel,B.T.Thakar,S.Zele,*Indian J.Chem.*,1999,38A,563.
- [35]. M.Valcarcel,M.D.LaqueCastro,"Flow-Through Biochemical sensors",Elsevier.,1994.

- [36]. U.Spichiger-Keller,"Chemical Seasor and Biosensors for Medical and Biological Applications.
- [37]. J.F.Lawrence,R.W.Frei,"Chemical Derivatization in Chromatography",Elsevier.,1976.
- [38]. S. Hu, T. Sheng, Y. Wen, R. Fu, X. Wu, *Inorg. Chem. Comm.*2012, 16, 28.
- [39]. Selvam,P.;Chandramohan,M.;De Clercq,E.;Witvrouw,M.;Pannecouque,C. *Eur J Pharm Sci.*,2001, 14 (4),313.
- [40]. D. Arish, N. S. Nair, *Arabian J. Chem.*, 2012, 5, 179
- [41]. More,P.G.Bhalvankar,R.B.Pattar,S.C.;*J Indian Chem.Soc.*,2001,78,474-475..
- [42]. *Chem.pharm bull (tokyo)*1993 Jul;41(7):1258-60.
- [43]. Yogesh Kumar Gupta , Vinita Gupta , Sanchita Singh,*J.of Pharm.*,2013,491-495.
- [44]. S.H.Gaikwad,S.V.Mahamuni,M.A.Anuse, *Indian journal of Chemical Technology*, 2005,365-368.
- [45]. A. H. Manikshete, S. K. Sarsamkar, S. A. Deodware,V. N. Kamble, M.R. Asabe, *Inorg. Chem. Comm.*2011, 14, 618.
- [46]. Bayer,E. *Chem Ber.*;1957,90 (10),2325.
- [47]. O.A.Fathalla,H.H.Radwan,S.M.Awad,M.S.Mohamed.,*Indian.J.Chem.*2006,980-985
- [48]. Vishwas D. Suryawanshi et al. Prashant V. Anbhule, Anil H. Gore, Shivajirao R. Patil , Govind B. Kolekar ,*Journal of photochemistry and photobiology B: Biology*,5January 2013, 1-8.
- [49]. Nemat M. Hassan , Mohamed I. Abu-Doubara , Mohamed A. Waly , Mamdouh M. Nemat Alla,*J.of Advanced Research* 2013,4,393-401.
- [50]. Alagarsamy V,Vijjyakumar S,Solomon VR.*Biomed Pharmacother.*2007;61(5):285-291
- [51]. Minhus, Q., Huifang, S., Xiaoping, Qi, J.C., 2007. *J. Rare Earths* 25, 721.
- [52]. Guo, Y.L., Dou, W., Wang, Y.W., Liu, W.S., Wang, D.Q., 2007. *Polyhedron* 26, 1699
- [53]. Kobayashi, S., Ishitani, H., 1995. *J. Chem. Commun.* 1, 1379.
- [54]. Shibaski, M., Sasai, H., Arai, T., 1997. *Angew. Chem.* 109, 1290.
- [55]. Surya Rao, D., Sadasiva Reddy, C., John, V.T., Ganorkar, M.C., 1980. *Curr. Sci.* 49, 511.
- [56]. Surya Rao, D., Subha Rao, B.L., John, V.T. 1978. *Nat. Acad. Sci. Lett.* 1, 402.

Title of Project: 8.

One-Pot Synthesis of Some Nitrogen Containing Heterocycles and Their Biological Activities

General Literature Review on Nitrogen Containing Heterocyclic Compounds: The nitrogen heterocycles are found in several biologically active natural products. These heterocycles are essential structural fragments of the large number of natural products such as alkaloids, vitamins and amino acid derivatives¹. The nitrogen heterocycle like pyrimidine is an integral part of genetic materials such as DNA and RNA. However, many of the nitrogen containing heterocyclic compounds possess a wide range of biological and pharmacological activities such as analgesic², antipyretic², antiviral³, anticancer³, anti-inflammatory, diuretic⁴, antihistamine, antidepressant, anti-tubercular, antifungal and hypertensive etc. Thus, the considerable drug activity of these compounds not only attracted many chemists to synthesize these heterocyclic compounds but also became an active research area. Many methods are available for the synthesis of these N containing heterocycles. But the one-pot and multi component reactions are emerged as valuable tools in the synthesis of heterocyclic compounds. Such environmentally benign chemical methodologies are strongly required in light of the paradigm shift to 'Green Chemistry'. Most of the nitrogen heterocycles play prominent role in medicinal chemistry and they have been used for drug development. Many of them were reported to possess a broad spectrum of biological activities such as antibacterial, antifungal, antihypertensive, cardio tonic, anticancer and antioxidant. Hence, there is need to synthesize new and effective nitrogen containing heterocyclic compounds.

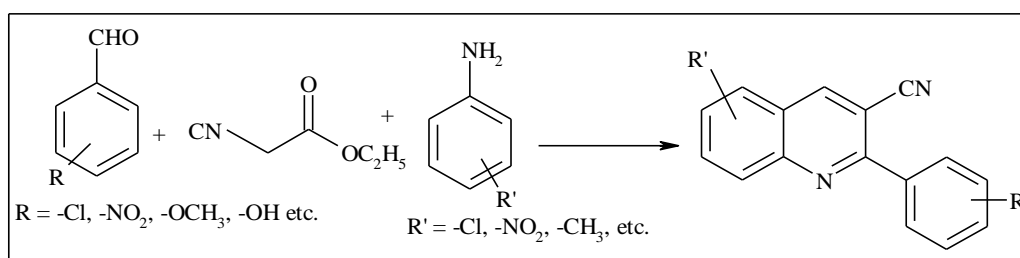
The research of nitrogen heterocycles and their derivatives has been going on continuously in search of new biologically active molecules. The various approaches have been reported for the synthesis of these nitrogen heterocycles and their derivatives. Earlier, a comprehensive review concerning pyrimidines has been published by Brown⁵. Abdel-Rahman et al.⁶ have reported the synthesis of some novel pyrimido [4,5-b]quinolin-4-one and tested for their anti-inflammatory, analgesic and antimicrobial activity. E. Ramesh and his co-workers⁷ synthesized some new quinoline derivatives and tested for their antibacterial activities. Whereas H.R.P. Naik et al.⁸ reported the synthesis of novel benzo[h]quinolines having antioxidant activity. P. Rajkumar et al.⁹ have reported the synthesis of some imidazole-based dicationic quinolinophanes and tested for their antibacterial activities. Moreover, A. Padmaja and coworkers¹⁰ have synthesized substituted pyrazoles, isoxazoles, pyrimidine, and thioxo-

pyrimidine derivatives having antibacterial and anti-oxidant activities. Many nitrogen containing heterocycles possess a wide range of biological activities such as antitumor, antiallergic, analgesic, antipyretic, antiviral, anticancer, anti-inflammatory, diuretic, antihistamine, antidepressant and anti-tubercular. The discovery of novel synthetic methodologies of these heterocyclic compounds is a pivotal-focal point of research activity in the field of medicinal chemistry. Molecular complexity and diversity in natural and biologically relevant system encourage chemists to investigate new methods and reactions. Now a day, several of such biologically active heterocyclic compounds are efficiently synthesized by highly elegant multi-component or domino reactions.

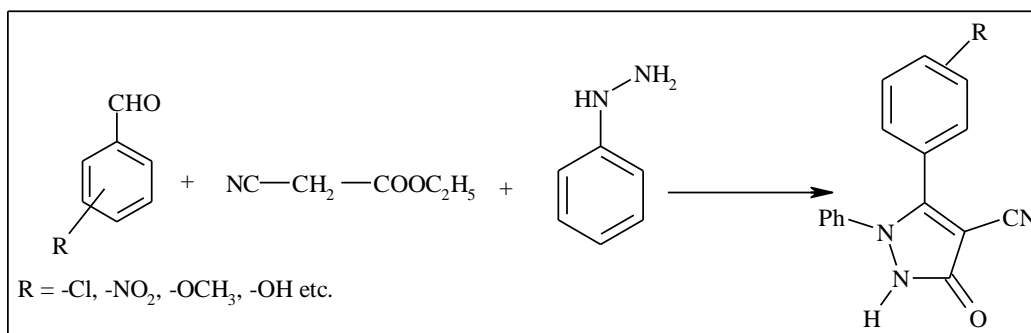
Significance of the study: The nitrogen containing heterocyclic compounds attracted organic chemists very much due to their biological and chemotherapeutics importance. In recent years, emergence of drug resistant organisms posed a challenge in the treatment of infectious diseases. Hence, there is need to synthesize new and effective antibacterial agents. Several of such biologically active heterocyclic compounds are synthesized in one-pot by multi-component reactions. This reaction causes the conversion of three or more starting materials in one pot to highly functionalized product displaying maximum molecular diversity, complexity and selectivity. Therefore these reactions are highly atom economic, ecofriendly and decreases the number of reaction steps, reaction time and the consumption of chemicals and solvents used. This leads to the green approach of the research work.

Methodology: The desired nitrogen containing heterocycles will be synthesized by one-pot and multi-component reactions as per the following schemes.

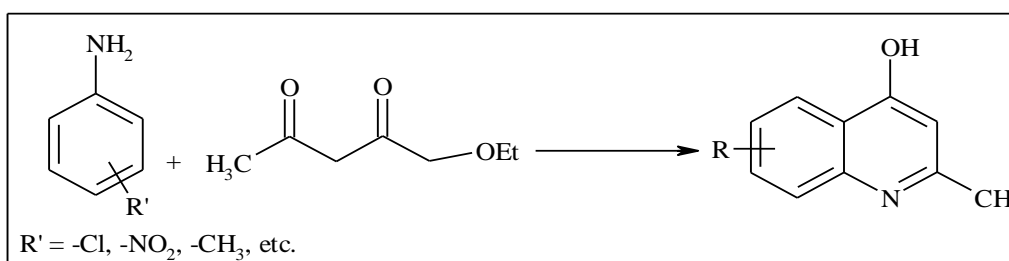
Scheme -I



Scheme- II



Scheme- III



Year-wise Plan of work: The proposed project work has been planned to complete within a period of three years. The tentative planning of the work is as follows

1. **The first half of the first year:** In the first phase of the study, reference work will be done. For proposed work, chemicals, glass wares and equipments will be purchased.
2. **The second half of the first year:** The required chemicals will be purified and synthesis of desired target molecules will be carried out.
3. **Second year:** In this phase, full attention will be devoted to the synthesis of nitrogen containing heterocycles as per above schemes.
4. **Third Year:** The synthesized compounds will be interpreted by **IR, ¹H NMR, ¹³C NMR, Mass spectra** as well as elemental analysis.
5. **Fourth year:** The synthesized nitrogen heterocycles will be tested for their biological activities. The research data will be submitted for publication.

Objectives of Research Work:

- ❖ In the proposed work, we have planned to synthesize some nitrogen containing heterocycles.
- ❖ These compounds will be synthesized in one pot and by multi-component reactions.

- ❖ The main objective is eco-friendly synthesis of nitrogen containing heterocycles and to study their biological activities.

References

- [1]. Y. L. Lin, R. L. Huang, C. M. Chang and Y. M. Kuo, *J. Nat. Prod.*; **1997**, 60, 982.
- [2]. F. J. Dian and T. J. Bardos, *J. Med. Chem.***1980**, 23, 569.
- [3]. C. C. Cheng, *Prog. Med.Chem.* **1969**, 6, 67-75.
- [4]. L. Garuti, M. Roberti, D. Pizzirani, *Mini-rev. Med. Chem.* **2007**, 7, 481-489.
- [5]. D. J. Brown, *Pyrimidine and their Benzo derivatives*, in : A. R. Katrizky, C.W. Rees [Eds.], *Comprehensive Heterocyclic Chemistry, The structure, Reactions, Synthesis and Uses of heterocyclic Compounds*, Pergamon Press, Oxford, **1984**, 6, 57-155.
- [6]. B. A. Abdel-Rahman, El-Gazzar, M. Mervat, El- Enany and N. Mahmoud *J. Bioorg. Chem.* **2008**, 16, 3261-3273.
- [7]. E. Ramesh , R. Durga, R. S. Manian , R. Raghunathan S. Sainath and M. Raghunathan. *Bioorg. & Med. Chem.* **2009**, 17, 660–666
- [8]. H. R.. Naik, H. S. B. Naik , T. R. R. Naik ,H. R. Naika, K. Gouthamchandra, R. Mahmoodb and B.M. Khadeer Ahamed, *Eur. J.of Med.Chem.* **2009**, 44, 981–989
- [9]. P. Rajkumar, R. Raja, S. Selvan R. Rengasamy and S. Nagarag; *Bioorg. & Med. Chem.* **2009**, 19, 3466-3470
- [10]. A. Pamaja, T. Payani, G. Dinneswara Reddy and V. Padmavati, *Eur. J. Chem.* **2009**, 1-10.

Title of Project: 9.
**Study of Oxidation Reactions Involving Isopolyoxometalates and
Heteropolyoxometalates**

Introduction: The properties of polyoxometalate (POM) anions make them suitable for application in almost all aspects of chemistry and material science. These salts are used [1–3] as oxidants and catalysts (both redox and acid) for various organic transformations. Most of the electron transfer reactions of POM anions and their mechanistic studies are concentrated [4] on the Keggin type POM as an oxidant containing hetero atom in its higher oxidation state. Variety of organic and inorganic substrates have been oxidized [1] by these POMs and the mechanisms generally follow outer sphere pathway. Polyoxometalate contains a hetero atom which is surrounded by number of oxoanions thus making the central hetero atom unavailable for the inner sphere interaction with the substrate. Chemistry of isopolyoxometalates and heteropolyoxometalates has received much attention in the recent past due to their application in areas like catalysis, material chemistry and biochemistry[1,2]. Remarkable degree of molecular tunability of polyoxometalates (POM) made them useful probes for fundamental and dynamic issues in chemistry[1]. Some of the fundamental problems addressed in recent research on POM systems include aspects of electron transfer in solution[3] and catalysis of organic processes[5]. The polyoxometalates also mimic the metalloenzymes in their activities.

On the utilitarian front, several catalytic processes involving POM's in both homogeneous and heterogeneous modes have been commercialized. These POM anions are ideal candidates for study of homogeneous outer-sphere electron-transfer redox reactions[3]. In heteropolyoxometalates, charge density is considerably lower due to complexation of transition metal ions with oxoanions like tungstates and molybdates, thus making them outer-sphere electron transfer reagents. The present study involves isopolyoxometalates and heteropolyoxometalates for the oxidation of some biomolecules and organic as well as inorganic substrates.

An Overview of the relevant literature: Isopolyoxometalates and heteropolyoxometalates containing various transition metals as hetero atoms have been prepared and used as redox, acid and electrocatalysts for several organic transformations[1]. Oxidation of inorganic and organic reductants like hypophosphite, methionine, pyridoxine, citric acid etc. by enneamolybdomanganate (IV) has been reported [6-9]. Therefore in the present proposed

work we wish to undertake the kinetics and mechanism of oxidation of some biomolecules, organic and inorganic substrates by isopolyoxometalates and heteropolyoxometalates in aqueous acidic solutions.

Methodology: The polyoxometalates are soluble in aqueous as well as non-aqueous solutions therefore the reactions will be studied in aqueous acid media. The salts of Keggin, Waugh, Anderson, Dawson etc. type will be prepared and characterized by various instrumental methods. The reaction conditions will be optimized with regard to the acid concentration in the reaction mixture, temperature and the concentration of substrate and the polyoxometalate. The optimized conditions will be used to determine various kinetic parameters like order of reaction, effect of temperature, effect of acid concentration, effect of ionic strength and effect of solvent polarity on the reaction. The reactions will also be performed in stoichiometric proportion of reactants and the products will be identified. From the kinetic data obtained and with the help of extrakinetic evidences like spectrophotometric examination of the reaction mixture for identifying intermediate species formed in the reaction and the test for the free radical formation a probable mechanism for the oxidation reaction will be proposed.

The chapter scheme of the proposed research work: The chapter scheme of the proposed work can be tentatively classified into four parts. The first part consists of oxidation of biomolecules like amino acids and the second chapter deals with the oxidation of some inorganic substrates like sulphites. The spectrophotometric and iodimetric methods are generally used for the determination of oxidized form of the polyoxometalate therefore an investigation of oxidation of some organic substrates in acidic solution will consist the third chapter. The fourth chapter will be on the oxidation of two-electron reductants like hypophosphite, phosphate etc.

Aims and Objectives:

- ❖ Synthesis and characterization of salts of Keggin, Waugh, Anderson, Dawson, etc. by various instrumental method.
- ❖ Oxidation of biomolecules, inorganic and organic substrates by maintaining reaction conditions.
- ❖ Determination of various kinetic parameters like order of reaction, effect of temperature, effect of acid concentration, effect of ionic strength, and effect of the solvent polarity on the reaction.
- ❖ Spectrophotometric examination of the reaction mixture for identifying intermediate species formed in the reaction.
- ❖ To propose the probable mechanism for the oxidation reaction.

References

- [1]. M. Sadakane and E. Steckhan, Chem. Rev. 98 (1998), p. 219.
- [2]. D. E. Katsoulis, Chem. Rev. 98 (1998), p. 359.
- [3]. I. A. Weinstock, Chem. Rev. 98 (1998), p. 113.
- [4]. G. A. Ayoko, Transition Met. Chem. 15 (1990), p. 421.
- [5]. S P Maradur, S B Halligudi, G S Gokavi, *Catalysis Lett*, 96 (2004) 165. /5/
- [6]. V.M. Gurame, A.R. Supale, G.S. Gokavi, *Amino Acids* 38 (2010) 789.
- [7]. V.M. Gurame, G.S. Gokavi, *Polyhedron* 27 (2008) 1905.
- [8]. S V Nipane, V M Gurame, G S Gokavi, *Inorganic Chemistry Communications* 14 (2011) 1102.
- [9]. Guoyan Huo, Taowei Ban, Wenlin Liu, Guotang Huo, Jinguan Shan, *Transition Met Chem* 30 (2005) 1032.

Title of Project: 10.

Shell fish waste for agricultural benefits: An ecofriendly waste management approach for increasing crop productivity

Research Background: Over the past two decades the shellfish processing industry has experienced a significant expansion. Marine industry generates 50–60 % of the total weight of shellfish as waste and considered as major environmental pollutant due to uncontrolled dumping. Crustaceans like shrimp, crabs, prawns, lobster, and krill generate nearly,75% of their total weight as waste. Shellfish is a valuable natural sea food and are processed by removing head, tail and carapace as waste. Solid wastes, including the head, shell, and tail portions, accumulate owing to processing. The accumulated wastes without appropriate utilization have resulted in problems related to waste disposal and environmental pollution. The utilization of waste is an ideal opportunity for the industries, as it can potentially make additional revenue.

Supplying food for the anticipated global population of over 9 billion in 2050 under changing climate conditions is one of the major challenges of the 21st century. Worldwide agricultural food production has to double in 2050 so as to feed the global increasing population while reducing dependency on conventional chemical fertilizers and pesticides. In order to achieve this goal, there is the need to explore the several mutualistic interactions between plant roots and rhizosphere microbiome.

Thus, shell fish waste management and fulfilling the increasing food demand are the two major issues that we have to address. Proposed ecofriendly and economically profitable approach has potential to deal with these issues simultaneously.

Objectives of the Study

- ❖ Collection and pretreatment of Shell fish waste
- ❖ Complete utilization of shell fish waste for the recovery of valuable biomolecules
- ❖ Characterization of recovered biomolecules by techniques like FTIR, SEM, HPLC, LCMS etc.
- ❖ Evaluation of plant growth promoting abilities of recovered biomolecules
- ❖ Development of strategies for increasing crop yield

Title of Project: 11.

Utilization of Agricultural waste for the production of industrially important proteases.

Research Background: Protease is mainly produced from animals, plants, and microorganisms but, production of proteases from plant and animal sources has some limitations because of climatic reasons and ethical issues respectively. However, the microbial proteases have two-third share of commercial production in the enzyme market worldwide. Protease is widely used in detergent, food processing, pharmaceutical industry, silk industry, and waste utilization.

Present study proposes utilization of agriculture waste for the production of industrially important microbial proteases. The purification, characterization and stability of produced proteases could be determined using various techniques.

Objectives:

- ❖ Isolation of protease producing microorganism using agriculture waste
- ❖ Formulation and optimization of protease production medium
- ❖ Optimization of protease production parameters
- ❖ Purification of protease
- ❖ Characterization of protease through techniques like PAGE, ion-exchange chromatography

Title of Project: 12.

Study of Ticks (Order: Ixodidae) from Domestic Animals in the Solapur District, Maharashtra with Special Reference to Their Ethnological Control

Choice of the topic with motivation and significance: The study of ticks in India was initiated by Linnaeus in 1758. The tick shows morphological characters typical of other acari, but their peculiarities and greater size (2,000 μm to 30,000 μm) clearly distinguish them from most other acarine. Besides, there are certain characters which are present and distinct throughout the ontogeny of ticks. A hypostome armed with retrorse teeth serves to anchor the tick to tie the host. A complex sensory Haller's organ is located on the dorsal side of the tarsus. Ticks are obligate blood-sucking ectoparasites of mammals, birds and reptiles. They affect human and animal health. The impact of ticks is related to their ability to transmit diseases to humans and animals (Rajput 2006)¹. Hence, ticks are responsible for severe economic losses in livestock both through direct and indirect effects. Direct effects can occur in several ways, as blood-sucking can cause a reduction in live weight, can limit livestock production and can induce anaemia among domestic animals. Tick bites reduce the quality of hides and may cause irritation and serious physical problems to ruminants. Indirect effects can be due to the infection by certain ticks (*Dermacentor andersoni*) of a toxin causing paralysis (Durrey et al. 2012)². Ticks are considered as main vectors for transmission of many viral, bacterial, rickettsial and parasitic pathogens (Garcia 2007)³. Several tick species are important in veterinary medicine as vectors of theileriosis, babesiosis and anaplasmosis. In addition, Lyme disease, ehrlichiosis, rocky mountain fever, Colorado tick fever, tularemia, Q fever, spotted fever, tick paralysis and tick encephalitis are the most common diseases which have been transmitted to humans by ticks. They transmit diseases, produce paralysis, weight loss and cause economic damage to livestock (Wall 2001)⁴. As ticks are the second most important group of medically important hematophagous arthropods after mosquitoes (Jaenson and Jensen 2007, de la Fuente et al. 2008), wild animals have a great impact on the epidemiology of tick borne diseases, potentially as reservoirs or amplifying hosts for some pathogens (Lorusso et al. 2011, D'Amico et al. 2017). The main factors for the emergence and spread of ticks and their pathogens are connected by a series of human activities, including habitat changes, deforestation, globalization of the economy, international animal movements, urbanization and climate change (Harrus and Baneth 2005, Mrljak et al. 2017).

The impact of climate change in Europe on the diversity of tick fauna was evidenced by the increased density and ability of ticks to spread into new areas, such as *Rhipicephalus sanguineus*, moving from the Mediterranean Basin to more Northerly latitudes, or *Dermacentor reticulatus* in some areas of Western Europe (Beugnet and Chalvet-Monfrey 2013). It may be that warmer winters and extended autumn and spring season will continue to drive an expansion of the distribution of some tick species to Northern latitudes and to higher altitudes (Beugnet and Chalvet-Monfrey 2013, Dantas-Torres 2015). Climate change will likely increase the climate niche of *I. ricinus*, including Northernmost areas of Europe as well as Northern Eurasian areas that were previously unsuitable for this species (Dantas-Torres 2015). Considering the above information of the topic, the study of tick diversity from the Solapur district will contribute in the advancement of the knowledge of ticks (Ixodidae). The study will also be useful to understand ethnological control measures of ticks infesting animals in selected study regions.

Statement of problem: As ticks are the second most important group of medically important hematophagarthropods after mosquitoes (Jaenson and Jensen 2007, de la Fuente et al. 2008). They infest the majority of domestic animals like cattle, sheep, goats, etc and transmit diseases, produce paralysis, weight loss and cause economic damage to livestock. As these animals are the second important income source of farmers, if such animals are infested by ticks (Ixodidae) it will simultaneously affect the growth of farmers. As ticks are considered as main vectors for transmission of many diseases including viral, bacterial, rickettsial and some parasitic pathogens, which can stunt the growth of such domestic animals and kill the animal in severe cases. Some tick species play the role of the vector of diseases like theileriosis, babesiosis and anaplasmosis. Such a tick is able to infect not only animals but also humans. Lyme disease, ehrlichiosis, rocky mountain fever, Colorado tick fever, tularemia, Q fever, spotted fever, tick paralysis and tick encephalitis are the most common diseases which have been transmitted to humans by ticks.

Review of literature: The report of tick fauna in Iran provided by Rahbari et al. (2007) indicated that the number of ticks on each animal was low and male ticks were more than the females. Nasiri et al. (2010) collected ticks from sheep in Abdanan Township and showed that the frequency of male and female ticks was (77%) and (23%), respectively. Several studies on the distribution of tick fauna have been reported. Salimabadi et al. (2010) reported 7 species of *Hy. dromedari*, *Hy. marginatum*, *Hy. anatolicum*, *Hy. detritum*, *Hy. asiaticum*, *Rh. sanguineus* and *De. marginatus* in Yazd Province. A study in Ilam Province exhibited 5 species of *Hy. marginatum*, *Hy. anatolicum*, *Hy. asiaticum*, *Hy. dromedari* and *He. sulcata*

(Nasiri et al. 2010). Rehman et al. (2004) reported different species of Ixodidae (hard ticks) in Rawalpindi and Islamabad of Pakistan. The prevalence of *He. sulcata* and *Hy. Anatolicum* was highly significant in this region. A cross-sectional study was conducted to determine the diversity and intensity of hard tick species infesting domestic buffalo and cattle from Haryana, India by Shivani Chhillar, Jainder Singh Chhilar, Harpreet Kaur (Investigations on Some Hard Ticks (Acari:Ixodidae) Infesting Domestic Buffalo and Cattle from Haryana, India) In this study they revealed *H. anaticum* and *Rhipicephalus (Boophilus)* are the most common vector species infesting buffalo and cattle in this state. [Investigations on Some Hard Ticks (Acari: Ixodidae) Infesting Domestic Buffalo and Cattle from Haryana, India. [Shivani Chhillar, Jainder Singh Chhilar, Harpreet Kaur] In the same study in West Bengal by A.K. Sanyal and S.K. De (Diversity in Ticks (Acari) of West Bengal), they found 32 species of ticks infesting a large variety of animals from domestic cat to tiger.[DIVERSITY IN TICKS (ACARI) OF WEST BENGAL (A. K. SANYAL & S. K. DE Zoological Survey of India, M-Block, New Alipore, Kolkata~700 053.)] In the paper, Species Diversity and Distribution of Ticks (Acari: Ixodidae) in Zabol County, Eastern Iran[*Maryam Ganjali 1 , Mansour Dabirzadeh 2, Masoud Sargolzaie 3] two common species *Hyalomma* and *Rhipicephalus* are distributed in their study area in Eastern Iran. Out of which the frequency of genus *Hyalomma* was higher than *Rhipicephalus* and the ratio of male is higher than that of female ticks.

Research objectives Considering the lack of information on ticks infesting domestic animals especially from Dist. Solapur, Maharashtra, India. Most of the farmers gain their income from their cattle, goats and sheep. If such animals get infected by tick-borne disease, then there will be an economical crisis. This study is planned with the objectives maintained below-

1. To study the morphology of identified tick (Ixodidae) species in Solapur District.
 - a). Study of Mouth Parts
 - b). Study of External Features
2. To study the diversity of species of ticks (Ixodidae) in Solapur District.
3. To study the host specificity of ticks (Ixodidae) in Solapur District.
 - a). Ticks on Cattles
 - b). Ticks on Pets
 - c). Ticks on Poultry (Hens and Roosters)
4. To study the species abundance of ticks (Ixodidae) in Solapur District.

5. To study the ethnological control and management practices of ticks (Ixodidae) in Solapur District.
 - a). Physical Control
 - b). Biological Control
 - c) Chemical Control

Hypothesis: The main reason behind this identification of ticks species is that farmers frequently import new buffalo, sheep, goats and cattle from other states of India. Another reason might be that these species of ticks were infesting wild populations and remained unreported but have now transferred to the domesticated varieties of cattle due to ecological changes. This fact tells the importance of knowledge of tick species. After completion of the research on tick diversity in Solapur Dist, Maharashtra; we will get the exact number of tick species and some new ethnological control measures which will be applied more efficiently in future.

Scope of research: As the incidence of the tick-borne disease increases and the geographic areas in which they are found is also expanding. So, it becomes increasingly important to distinguish tick species, which is essential to promote tick and tick-borne disease control. The results obtained from the present study serve as the starting point for future epidemiological studies and further investigations are needed to detect the vector role of ticks in this area.

Methodology of research: The study is completely based on ticks infesting domestic animals like cattle, goats, sheep, etc. from Solapur District, Maharashtra. According to the study, it is important to know some methods as mentioned below-

A. Methods of Research

- a) **Locating domestic animals in the selected area:** The different livestock pocket areas from Barshi and Madha Taluka, Dist. Solapur, Maharashtra and will be visited.
- b) **Visiting the Government Veterinary Hospitals:** Periodic visiting (twice in a month) will be done to study the frequency and varieties of the tick-infested animals and the symptoms in the same area infected by ticks in the selected area.
- c) **Atmosphere:** Recording the average climatic conditions and geographic features in the same area.

B. Sampling Design

- a) **Site Observation:** Observation of tick-infested domestic animals from the field in the selected area.

- b) **Collection and Separation of Tick (Ixodidae):** According to the preferred site of attachment the ticks will be collected in the sampling bottles. Those ticks will be separated according to the preferred site of attachment like the ear, anal and peri-anal, abdomen, tail, etc.
- c) **Preservation:** Preservation will be done only if necessary. The specimen will be subjected to boil in 10% Sodium Hydroxide solution to render the non-chitinou substance to be transparent. Treated ticks will be washed thoroughly with water and dehydrated in ascending grades of alcohol and cleared in the mixture of absolute alcohol and clove oil. Cleared ticks will be mounted on a glass slide in Canada Balsam.

C. Study Area

There are two selected talukas in which study will be conducted; Barshi and Madha taluka Gadegaon, Khandavi, Soundare are the villages situated in Barshi taluka, Ridhore and Wadshinge are those in Madha Taluka will be considered as study area.

D. Research Design

- a) Visits will be done twice in a month.
- b) Approximately 5 cows, 5 buffaloes, 5 goats, 5 cats, 5 dogs, 5 hen will be taken for the study from different locations in the selected per study area. Time required per visit is about 2 to 3 hours. Therefore at the end of the year we will have data of approximately 1800 (150 animals per month) animals. After 3 years data of approximately 5400 animals will be available for the tick (Ixodidae) study in the Barshi and Madha Taluka, Solapur District.
- c) Domestic animals to be studied are as: Cows, Buffaloes, Goat, Cat, Dog, Hen.

Cattles	Pets
Cow 5	Cat 5
Buffalo 5	Dog 5
Goat 5	Hens & Roosters 5
Total Animals = 15	Total Animals = 15

Tools Used: Sampling bottles, Gloves, Forceps, Gas Lighter, Macro Lens, Camera, etc When specimens collected they will be identified on the basis of morphotaxonomic features by following the *standard identification keys of ZSI* available for the identification. Ticks will be observed under a stereo zoom microscope and photographed using a camera.

Methods of Data Collection: As the data will be from the present study, Shannon Index will be used for the statistical analysis of the data.

Time frame for research:

Sr. No.	Duration	Work
1	1-6 Months	Literature Review and Analysis, Standard Identification Keys, Selection of Livestock Pocket Areas, Collection of Ticks (Ixodidae) and Its Preservation if necessary, Study of Morphology of Collected Ticks, Investigation of Ethnological Control Measures
2	6-12 Months	Literature Review and Analysis, Standard Identification Keys, Identification of Collected Ticks (Ixodidae), Study of <i>standard identification keys (ZSI)</i> for the identification, Investigation of Ethnological Control Measures
3	12-18 Months	Literature Review and Analysis, Standard Identification Keys, Study of Morphology, Frequency of tick-borne disease in the Solapur District, Investigation of Ethnological Control Measures
4	18-24 Months	Literature Review and Analysis, Standard Identification Keys, Study of Abundance of Ticks (Ixodidae), Data Analysis, Writing Research Paper
5	24-30 Months	Statistical Analysis of Collected Data and Compilation of Data, Writing Initial Part of Thesis
6	30-36 Months	Publication of Research Papers

References

- [1]. Kaiser MN, Hoogstraal H (1963) The Hyalomma ticks (Ixodidae) of Afghanistan. J Parasitol.
- [2]. Trapido H, Varma MGR, Rajagopalan PK, Singh KRP, Rebello MJ. A guide to the identification of all stages of the Haemaphysalis ticks of South India. Bulletin of Entomological Research 1964;
- [3]. Kaiser MN, Hoogstraal H. The Hyalomma ticks (Ixodoidea, Ixodidae) of Pakistan, India and Ceylon, with keys to subgenera and species. Acarologia 1964;
- [4]. Yunker CE, Keirans JE, Clifford CM, Easton ER. Dermacentor ticks (Acari: Ixodoidea: Ixodidae) of the new world: a scanning electron microscope atlas. Proceedings of the Entomological Society of Washington 1986
- [5]. Keirans JE, Litwak TR. Pictorial Key to the Adults of Hard Ticks, Family Ixodidae (Ixodida: Ixodoidea), East of the Mississippi River. Journal of Medical Entomology 1989

- [6]. Petney TN, Keirans JE. Ticks of the genera *Amblyomma* and *Hyalomma* from South-east Asia. *Tropical Biomedicine* 1995
- [7]. Petney TN, Keirans JE. Ticks of the genera *Boophilus*, *Dermacentor*, *Nosomma* and *Rhipicephalus* (Acari: Ixodidae) in Southeast Asia. *Tropical Biomedicine* 1996
- [8]. DIVERSITY IN TICKS (ACARI) OF WEST BENGAL (A. K. SANYAL & S. K. DE Zoological Survey of India, M-Block, New Alipore, Kolkata~700 053.) 2001
- [9]. Wall R, Shearer D (2001) *Veterinary ectoparasite: biology, pathology and control*. 2nd Ed. Blackwell Science Ltd
- [10]. Walker AR, Bouattour A, Camicas JL, Estrada-Pena A, Horak IG, Latif AA, Pegram RG, Preston PM. *Ticks of domestic animals in Africa: a guide to the identification of species*. 2003
- [11]. Garcia L. Sh, MS, MT, CLS, F (AAM) (2007) *Diagnostic Medical Parasitology*. 5th Ed American Society for Microbiology.
- [12]. Species Diversity and Distribution of Ticks (Acari: Ixodidae) in Zabol County, Eastern Iran [*Maryam Ganjali 1, Mansour Dabirzadeh 2, Masoud Sargolzaie 3] 2012.
- [13]. Investigations on Some Hard Ticks (Acari: Ixodidae) Infesting Domestic Buffalo and Cattle from Haryana, India. [Shivani Chhillar, Jainder Singh Chhilar, Harpreet Kaur] 2014.

Title of Project: 13.

Limnological Study of Khadakwasla Reservoir of Pune Region, Maharashtra (India)

Choice of the topic with motivation and significance: The ecological diversity of aquatic ecosystem is affected by different environmental conditions and manmade activities. Limnological study of reservoir is essential to know interrelationship between living organisms with abiotic factors. Favorable physicochemical condition of reservoir play significant role to enrich the fauna Study of diversity is essential to keep records and conserve them. Fishes are important animal in the fresh water ecosystems due to their ecological significance. Freshwater fishes also have economical viability. Conservation of Freshwater fish is equally important as a source of food, important position in food chain and conservation practice is only possible when diversity of Freshwater fishes is known. Zooplanktons are small animals that float freely in the water column of the Lakes, Reservoirs, Ponds and Oceans and its distributions is primarily determined by water currents. The Zooplankton community of most lakes ranges in size from a few tens of microns. Zooplanktons play an important role in aquatic food webs because they are important food for fish and invertebrate predators and they graze heavily on algae, bacteria, protozoa, and other invertebrates.

Statement of the problem: Limnology is an interdisciplinary science which involves a great deal of detailed field as well as laboratory studies to understand the structural and functional aspects and problems associated with the freshwater environment, from a holistic point of view. Aquatic biodiversity is threatened primarily by human abuse and mismanagement of both living resources and the ecosystems that support them. Most of the ponds getting polluted due to domestic waste, sewage, industrial and agricultural effluents. The requirement of water in all lives, from micro-organisms to man, is a serious problem today because all water resources have reached to a point of crisis due to unplanned urbanization and industrialization. There is a rich diversity of fish in Khadakwasla, Pune region which indicate major part of life which is threatened by human activities. Diversity of fish is useful for implantation conservation strategies and make fisherman scientific train also aware for fishing to avoid immature fishing.

Review of relevant literature: Freshwater habitat management in India raises both concern and hope. Concern arises out of the missing elements in current fish habitat research, planning and management of resource. The hope for the future is increasing public awareness

on the need for better resource management and environmental conservation. In the backdrop of the learning from implantation of the eco-restoration programs, the task appears to be not only challenging but also demanding in terms of participation of stake holders, commitment of resources, backup of research support, monitoring of environmental standards, enforcement of regulation and setting up of priorities in terms of conservation of the natural assets.

Study Area: Khadakwasla is a village, situated about 21 km from Pune and is mainly known for a dam on the river Mutha. The dam is one of the main sources of water for the city of Pune. The dam created a reservoir known as Khadakwasla Lake. In vicinity, there is well known National Defense Academy and Central Water and Power Research Station (CWPRS). The dam was first built by the British in 1879 on small canal running parallel to the Mutha River. In 1961, the Khadakwasla Dam had to be blown, as the upstream Panshet Dam overflowed, causing devastating floods in the city of Pune. The dam was later rebuilt. The original dam, built in the 1879 as a masonry gravity dam was the first of its kind in the world.

Details of Khadakwasla Dam are as follows:-

Impounds	Mutha River
Height	31.79m
Length	1939m
Opening year	1869
Dam owner(s)	Government of Maharashtra

Details of Khadakwasla Reservoir are as follows-

Creates	Khadakwasla Lake
Total Capacity	341 Million Cubic Meter.

International: International status: Limnology as it flourished as a different branch of science chiefly concerns with ecology of fresh waters. The discovery of plankton by Victor Hensen (1887) was an outstanding event in the field of limnology and opened up a new vista. Storm (1924), Howland and Lucy (1931), Hutchinson (1932) and Yoshimura (1932) studied freshwater lakes. Limnology in the United States is poorly connected to applications (kalff1991). Assessments of aquatic systems often are conducted without the participation of limnologists, even where a role for limnology is obvious. This is ironic, given the particular attention that limnology has given to problems of anthropogenic origin (eutrophication, acidification). Poor connections may be in the part the legacy of past societal attitudes that

have emphasized extraction and exploitation of specific resources, rather than a concern for sustainability of ecosystem functions and multivariate management (Lewis 1994, Kreiter 1994).

India: National status: In India, Pioneering efforts on limnology of impounded water were initiated by Ganapati (1940) and by Madras State Fisheries Department (Raj, 1941). Later on a number of publications on the limnology of fresh water of India have appeared. Rao and Govind (1964), Hussainy (1967), Vasist (1968) and others investigated different limnological aspects of impounded water in India. Sreenivasan (1964, 65, 66) made an extensive study on the limnology of fresh water impoundments in Tamil Nadu in relation to productivity. Notable contributions towards the limnology of fresh water around Hyderabad are those of Zafar (1966, 1986), Venkateswarulu (1969), Senayya (1971), Reddy et al. (1986) and others. Most of these contributions are confined to the ponds, rivers, streams or man-made lakes covering different dimensions. The earlier studies on water quality of a fish farming pond in India were conducted by Sewell (1927) and after that many workers have studied the physico-chemical conditions of inland waters either in relation to fish mortality or as part of general hydrological survey (Alikunhi et al., 1952 and Upadhyaya, 1964). The details of various lake ecosystems also have been studied by (Johri, 1990; Pani and Misra, 2000; Chaturbuj et al., 2004; Moundiotiya et al., 2004; Sisodia and Moundiotiya, 2006; Kumar et al., 2009; Mahesha and Balasubramanian, 2010 and Dubey et al., 2013). In the present study, an attempt has been made to study limnological factors of Khadakwasla dam in Pune region and their role with zooplankton and fishes.

Objectives of the study:

The study was aimed with the following objectives:

- ❖ To Study the Physicochemical parameters of Khadakwasla reservoir.
- ❖ To Study the life especially zooplankton and fishes living in reservoir.
- ❖ To Study the Biological parameters of Khadakwasla reservoir.
- ❖ Collection and Identification of freshwater zooplanktons and fishes.
- ❖ To Study the seasonal diversity of fishes from Khadakwasla reservoir.
- ❖ Monitoring Zooplankton levels and stocking fish at the appropriate movement.

Hypothesis: Physico-chemical parameters of Khadakwasla water are favorable for growth and development of zooplankton diversity. Availability of nutritious food plays a key role to enrich the fish fauna which is commercially important as it has a rich source of protein content.

Scope of the research:

- Survey and study of aquatic organisms and their interaction with abiotic environment

- Potentially to increase the production of Zooplanktons by appropriate management strategies in fish ponds.
- Control of environmental variables favoring Zooplankton development and utilizing sustainable fish stocking densities.
- To study the varieties of fishes by their taxonomic order.
- To study the fluctuation of fishes according to different seasons.
- To study the impact of zooplanktons on fishes according to changes of seasons.
- To generate gainful rural employment with special reference to fishing communities.

Methods of research: The present study comprises analyses of physicochemical parameters of Khadakwasla reservoir as a possible study site for zooplankton and fishes. Physical parameters of the reservoir play important role with regard to its stability for propagation of different types of fishes. The methodology adopted to conduct above mentioned studies as follows.

1. Sampling stations: There has been an apparent similarity and uniformity in the physical appearance of water along the stretch of the reservoir. The aquatic macro vegetation was remarkably scarce. Different sample stations will be selected from the reservoir.

2. Sampling method: Sampling is the most important part of any limnological investigation. It is such a critical activity that the success, achievements and failure largely depend on the strategy and plan of collection of samples.

Analysis of current water sample (Zooplanktons and Fishes): Collection and analysis of physico-chemical properties of water. Collection, analysis and enlist of current zooplanktons. Collection, analysis and enlist of current water fishes.

Collection of material (different type of fishes and zooplanktons): Water samples are taken using plankton net. The water samples for planktons were collected by filtering the water through plankton net of different size of mesh. And immediately it will be stored in 4% of formalin. The samples will be tagged for biomass, taxonomical and numerical studies. The individual species of zooplankton and fishes will be sort-out and identify. Fishes will be collected in different season with the help of fisherman and preserve in 4% of formalin for identification.

Identification of Zooplanktons and Fishes: The species will be identifying by the help of standard keys and different references.

Research Plan:

Sr. No.	Duration	Work
1	1-6 Months	Review of relevant literature, collection of samples, Survey of site to check Physicochemical parameters of reservoir.
2	6-12 Months	Review of relevant literature, Study of fauna and their interaction with the abiotic factors Survey of site to check biological parameters of reservoir.
3	12-18 Months	Review of relevant literature, study of seasonal diversity of fishes, Study of morphology of fish and Zooplanktons.
4	18-24 Months	Review of relevant literature, study of seasonal abundance of Fishes and Zooplanktons, Analysis of data.
5	24-30 Months	Review of relevant literature, study of seasonal fluctuation of physicochemical parameters, publication of research papers.
6	30-36 Months	Review of relevant literature, seasonal fluctuation of physicochemical parameters and publication of research papers.

References

- [1].Ade,P.P., Wankhede,G.N. 2001. Limnological studies of Amaravati University reservoirs with reference to trophic status and conservation, Ph.D. Thesis, Amaravati University, Amaravati.
- [2].Johri, M.1990.Limnological and water quality status of bhopal lakes with special reference to zooplankton,macrophytes and periphyton components, Ph.D. Thesis, Barkatulla university, Bhopal.
- [3].Muley,D.V. and Patil,I.M.,2006. A study of water quality and fish diversity of pauna river, Maharashtra.j.aqua.biol.
- [4].Munawar,M.,1970. Limnological studies on fresh water ponds of Hyderabad, India.
- [5].Patil S.G. and Sen, N. 1983. Limnological studies of an high altitudinal reservoir, Shillong, Meghalaya. The abiotic factors, J. Aqua.Biol. 1983.
- [6].Ruttner,F.1953. Fundamentals of Limnology. Univ.of Toronto press.
- [7].Robert G. Wetzel, in Limnology(Third Edition), 2001
- [8].Sakhre,V.B.,2001. Ecology of Palas Nlegaon reserovor in Osmanabad district, Maharashtra. J.aqua.biol.
- [9].Sreenivasan, A. 1965. Limnology of tropical impoundments.
- [10]. Zafar, A.R. 1996. Limnology of Hussain Sagar Lake, Hydrabad, India.

In conclusion we want to develop facilities in all science departments where they can orient themselves in the area of current science with an interdisciplinary approach for device or product formulation, analysis of products to the application of devices at mass scale. We, as an institution, have a goal of science with the people, for the people, on the people and by the people. The high-end instrument-laboratory should serve the purpose of skill enhancement among the students with core knowledge of fundamental principal of basic sciences. We want to develop employability skill through the internships at college and with collaboration with our neighbouring institutions. We look forward that our proposal to be accepted to contribute our role in the growing arenas of basic sciences which needs to be strengthen more with the help of such government schemes.

18. Has the College received support under the FIST Program in previous years at Level '0'?
If so, indicate:

NIL

- i) Project No.
- ii) Amount Received and Expenditure (Rs in lakh)
- iii) Impact of that support in College's profile & growth (as per Annexure – 1).

19. Details of the funds requested for 5 years.

Grant Head		Budget Heads	Total INR Cost
A Capital (C)	A1	Equipment	1,25,16,285/-
	A2 (Fixed %)	Infrastructure (Max. @ 8% of Equipment cost (Capital)	7,00,000/-
	A3 (Fixed % and 0 Level)	Networking (Max. @ 5% of project cost (Capital)	5,83,000/-
B General (G)	B1(Fixed @ project cost)	Industrial R&D support* [@ Rs. 1.0 L (Project cost ^{\$} ≤ Rs 100.0 L) [@ Rs. 1.0 L (Project cost ^{\$} > Rs 100.0 L)]	-
	B2 (Fixed)	SSR Activities ^{\$\$} (@ Rs. 1.0L)	-
	B3 (Fixed @ project cost)	Maintenance [@ 10% Project cost]	12,00,000/-
TOTAL: [A (Capital) + B (General)]			1,49,99,285/-

* Incentive grants for extending utilization of FIST facilities for the industries/ MSMEs/ Start-ups etc.

Incentive grants for carrying out activities pertaining to the Scientific Social Responsibility (SSR)

\$ Exclusive of Maintenance cost

19. Details of each Budget Heads with full justifications for each item as given at Sr. No. 19 including details of similar support from any other sources.

A: Capital (C)				
Equipments (A1)				
Name of Equipment	Justification	Price/unit	Quantity	Total Prices
Table top SEM [Model No. 1193913 and PW-600-002] {Magnification range optical: 27x Magnification range SEM: 160 – 175,000x Acceleration voltages: presets at 5kV and 10kV. Upgradeable with EDS detector and ProSuite application software.}	This instrument is used to correlation of surface appearance and surface morphology, elemental mapping, elemental analysis of micron-sized features etc.	68,34,713/-	1	68,34,713/-
Microprocessor Based Double Beam UV Visible Spectrophotometer with 2901 with 8” Colour Touch Screen Wavelength : 190-1100nm Band Width: 1 nm	This instrument is used for -determination of absorbance and transmittance of the sample under study -determination of impurities -quantitative and qualitative analysis	3,09,750/-	1	3,09,750/-
Model No. 5500 (FTIR-Spectrometer With Software), Size: Standard Brand: Eagle Instruments Model Name/Number: 5500 (FTIR-Spectrometer With Software)	This instrument is used for -identification of organic, polymeric and inorganic materials -determination of chemical, physical and rheological properties and grain hardness -determination of extra virgin olive oil adulteration with various vegetable oil.	18,90,999/-	1	18,90,999/-
Model of SS30AAA, a class AAA Solar	This instrument is used for			

<p>Simulator at one (1) sun, with 30mmX30mm area of illumination. The COMPLETE model of SS30AAA system includes: 1- Light Source with Light Intensity Feedback to provide more stable output. 2- Manual and Automatic Shutter Control. 3- A 120 or 210 VAC, 50/60 Hz, Single Phase Power Supply. 4- Air Mass Filter of AM1.5 Global. 5- Electro-Mechanical controller mounted on the front panel. 6- Plateform underneath the SS30AAA for smaple placement. 7- Reference cell and voltmeter for intensity adjustment of the system. 8- Cables, safety & Adjustment tools, Operating manual, and a two (2) year warranty. With Basic IV measurement Max. current range(A) ± 1 Max voltage Range (V) ± 200 Max.power (W) 20 Measurement Resolution: 16 bit Basic s/w to measure Isc, Voc, Im, Vm, Pm & FF Computer Interface for Keithley IV source</p>	<p>-photovoltaic cell performance -determining the electric performance of the photovoltaic cells -comparison of cell characteristics among the group of the cell -repeated measurement of the same cell to study the life cycle</p>	<p>29,59,440/-</p>	<p>1</p>	<p>29,59,440/-</p>
<p>Lyophiliser with -50 degree</p>	<p>It is used for microbiological applications.</p>	<p>2,53,110/-</p>	<p>1</p>	<p>2,53,110/-</p>
<p>Magnetic Susceptibility by Gouy's Method unit</p>	<p>This unit is used to find magnetic susceptibility of materials.</p>	<p>2,68,273/-</p>	<p>1</p>	<p>2,68,273/-</p>
<p>Total amount</p>				<p>1,25,16,285/-</p>
<p>Infrastructure Facilities (A2)</p>				
<p>Central laboratory facility</p>	<p>The college has separate Common</p>	<p>One time use</p>	<p>-</p>	<p>4,00,000/-</p>

	facility centre. It will be strengthened through this grants			
Work stations and cabinets	To install SEM, UV and FTIR, required separate workstation and cabinets.	One time use	-	2,00,000/-
Journal subscription	The grant is used to subscribe some new research related journals	10000/Year	10000x5= 50,000/-	50,000/-
books	The grant is used to purchase some new research related books.	10000/Year	10000x5= 50,000/-	50,000/-
Total amount				7,00,000/-
Networking and Computational Facilities (A3)				
Computers	To make central computational Lab. for researchers and students	40,000/PC For One time	40,000x10= 4,00,000/-	4,00,000/-
Video capturing Camera with Camtasia-2021 Software	The camera with software is required to make e-contains. (Modules)	1,35,000/- For One time	1,35,000x1= 1,35,000/-	1,35,000/-
Network Laserjet printer	It has to use in common facility centre for print the results of SEM, UV and FTIR.	48,000/- For One time	48,000x1= 48,000/-	48,000/-
Total amount				583,000/-
B: General (G)				
Industrial R&D support (B1): NIL				
SSR Activities(B2):NIL				
Maintenance of Equipment (B3)				
Laboratory maintenance includes miscellaneous items i.e. glasswares, reagents, kits, chemicals etc.	To run proposed project, Chemicals, substrate, reagents, glasswares and other necessary things will be perched through this grants.	50,000/Year	50,000x5= 2,50,000/-	2,50,000/-
	As we discussed engineers regarding maintenance of SEM, Solar Simulator, and other equipments. It is			

<p>Purchased equipment maintenance charges</p>	<p>clear that these equipments require maintenance as after one year, Solar Simulator will have problem of Xenon lamp so it has to replace therefor it requires 60000/year including engineer's charge. In SEM, there will be problem of tube it has to replace every year it requires 85000/year including engineer's charge. And for other instruments on average it require 32500/year maintenance charge including engineer's charge. These maintenance charges will be utilized through grants under this head.</p>	<p>For Solar Simulator 60,000/Year For SEM 85,000/Year For other equipments 32,500/Year</p>	<p>60000x4= 2,40,000/- 85000x4= 3,40,000/- 32500x4= 1,30,000/-</p>	<p>7,10,000/-</p>
<p>Research needed visit, Sample analysis for Atomic absorptions , XPS, BET, XRD, TEM, NMR etc. from outside charge</p>	<p>1) The synthesed materials will be analysed by various techniques such as XPS, BET, XRD, TEM etc. but these characterization are expensive and also we cannot afford all time. Some grants will be utilised for the same. 2) When outside researchers purposely visit to our college then their hospitality will be charged through</p>	<p>48,000/Year</p>	<p>48,000x5= 2,40,000/-</p>	<p>2,40,000/-</p>

	this grant For 5 Years			
Total amount				12,00,000/-
Grand Total [A: Capital (C)+ B: General (G)]				1,49,99,285/-

The cost and maintenance of some of the instruments like XRD, TEM, XPS, 1H and 13C NMR etc. is too high. In Nanded, Kolhapur and Pune, our institution has collaboration with such centres which are having such facilities. So it is suggested that after primary testing and sampling, materials can be analysed in such laboratories therefore we have kept budget head in section B: (B3) for sample analysis for detection of nano tubes and similar experiments.

We have asked for Scanning Electron Microscope, as it has a multiple use in the ongoing and proposed projects in the institution as morphology can be known from the SEM as well as EDAS can also be found by it. It would be helpful to know the fundamental information of the materials.

In order to explore the natural products and herbals for their possible activities as antiviral, anticancer and lifestyle diseases we require FTIR and double beam UV-Spectrometer. It will fulfil departments need towards following WHO guided extraction protocols and is required by all involved in the research in the area of material synthesis. For quality analysis of prepared materials especially for ash values Muffle Furnace with nitrogen environment is required.

Networking and Computational facilities: At the present time, lecture capturing and uploading to YouTube is reflecting as identity of institute. Moreover creating the modules related to the subject is advances in teaching skill. We plan to develop e-contents or modules in our college therefore it need video capturing camera with camtasia-2021 software for this purpose we also need to upgrade our current web and networking system. This can be used further for UG to conduct quiz-interactive sessions as well as for PG to arrange webinars. We need to add more computers, as each new equipment will require computer to upload its software. Also as many old computers are out of order and UG curriculum has computer practical which necessitates up gradation of current computer lab. Literature survey is one of the basic essentiality of research, crucial for quality work. It is a research discovery


application that provides unlimited access to world's most comprehensive source of references related to substances, reactions and patents.

Equipment Maintenance: Since new equipments may include a warranty clause, SEM requirements may arise only the second or third year onwards and have been included as such. We also need funds for maintenance and repairs of our old equipments.

20. Specify the recipient of the Grant (Principal / Any other) by attaching an endorsement from Head of Institution/College.

Yes, we have prepared separately copy of it.

Information submitted as above are true and correct


DR. SHIVAJI D. WAGHMARE

(Program coordinator)


DR. PRAKASH R. THORAT
PRINCIPAL

(Seal and Signature of Principal of the College)
Barshi, Dist. Solapur-413411.



SUPPORTING DOCUMENTS

- ✓ Annexure I – University Affiliation Certificate
- ✓ Annexure II – Government Aided Certificate
- ✓ Annexure III – 2F and 2B Certificate
- ✓ Annexure IV – NAAC Certificate
- ✓ Annexure V – Academic and Administrative Audit (AAA) certificate
- ✓ Annexure VI – Best College award certificate
- ✓ Annexure VII – NIRF Ranking certificate
- ✓ Annexure VIII – DBT Star College award Letter-2017
- ✓ Annexure IX – DBT Star College Status award Email-2020
- ✓ Annexure X – Best NSS Unit award Certificate

University Affiliation Certificate**सोलापूर विद्यापीठ**

सोलापूर-पुणे राष्ट्रीय महामार्ग, केगाव,
सोलापूर - ४१३ २५५ (महाराष्ट्र)
Website : <http://su.digitaluniversity.ac>
PABX No. : +91-0217-2744771, 72, 73, 74, 78, 79

**SOLAPUR UNIVERSITY**

Solapur-Pune National Highway, Kegaon,
SOLAPUR - 413 255 (Maharashtra)
Email : registrar@sus.ac.in
Fax : +91-0217-2744770

Ref. No. : SUS/

Ref.No.: SUS/AFFI/2018/ 10473

Date : 7 DEC 2018

CERTIFICATE

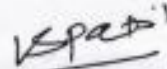
This is to certify that Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur, 413 401 Maharashtra is affiliated to Solapur University, Solapur, since inception of this University. The status of affiliation of said college is as mentioned below.

Sr.No.	Name of the Course and Duration	Affiliation Status		Period of Validity for the year(s)
		Permanent	Temporary	
1	B.A. Three Years	Permanent		--
2	B.Sc. Three Years	Permanent		--
3	B.A.(Sangeet) Three Years	Temporary		Up to A.Y. 2020-21
4	B.Sc.(Computer Science) Three Years	Temporary		Up to A.Y. 2012-13
5	M.A.(Marathi) Two Years	Permanent		--
6	M.A.(Hindi) Two Years	Permanent		--
7	M.A.(English) Two Years	Permanent		--
8	M.A.(Economics) Two Years	Temporary		Up to A.Y. 2018-19
9	M.A.(History) Two Years	Temporary		Up to A.Y. 2020-21
10	M.A.(Political Science) Two Years	Temporary		Up to A.Y. 2019-20
11	M.A.(Geography) Two Years	Temporary		Up to A.Y. 2017-18
12	M.Sc.(Microbiology) Two Years	Temporary		Up to A.Y. 2020-21
13	M.Sc. Physics (Nanophysics) Two Years	Temporary (First Affiliation Part - I)		A.Y. 2018-19
14	M.Sc. Chemistry (Analytical Chemistry) Two Years	Temporary (First Affiliation Part - I)		A.Y. 2018-19
15	Ph.D. Programme in Marathi Three Years	Temporary		2016-17 to 2020-21
	Ph.D. Programme in Hindi Three Years	Temporary		Applied for Continuation of affiliation in 2018-19
	Ph.D. Programme in English Three Years	Temporary		2016-17 to 2020-21
	Ph.D. Programme in History Three Years	Temporary		2015-16 to 2019-20
	Ph.D. Programme in Political	Temporary		2016-17 to 2020-21

Ph.D. Programme in Geography Three Years	Temporary	2016-17 to 2020-21
Ph.D. Programme in Physics Three Years	Temporary	2016-17 to 2020-21
Ph.D. Programme in Chemistry Three Years	Temporary	2016-17 to 2020-21
Ph.D. Programme in Microbiology Three Years	Temporary	2014-15 to 2018-19
Ph.D. Programme in Electronics Three Years	Temporary	2016-17 to 2020-21
Ph.D. Programme in Zoology Three Years	Temporary	2016-17 to 2020-21

The process of Continuation of Affiliation of M.A. (Geography) Course for the Academic Year 2018-19 and B.Sc. (Computer Science) Course for the Academic Year 2013-14 is in progress.

This certificate is issued upon the request letter of the said college.


 (Prof. Dr. V.B. Patil)
 Officer on Special Duty
 Academic, Research and Development

Government Aided Certificate



Below Government Notification No. UFF 8761 dated 31-10-1961 from the Under Secretary to Government of Maharashtra, Education and Social Welfare Department, Bombay regarding extension of affiliation of the Shri Shivaji Mahavidyalaya Barshi.

NOTIFICATION
Education and Social Welfare Department,
Sachivalaya Annexe,
Bombay-38.

31st October, 1961.

No. UFF 8761. Under Sub-sections (3) and (4) of Section (33) of the Poona University Act, 1948, the Government of Maharashtra is pleased to sanction the extension of the affiliation of the Shri Shivaji Mahavidyalaya Barshi (District Solapur) to the Poona University, for teaching the courses of study leading to the first year examination of the Three Year B.A. Degree course in English, Additional English, Marathi, Hindi, Sanskrit, Ardhanagari, Logic, and Scientific Method, Mathematics and Civilization (Science) and the first year of the B.Sc. Three year Degree course examination in English, Physics, Chemistry, Mathematics, Biology, Psychology and Economics and the first year examination of the Three year B.Com. degree course in English, Additional English, Accountancy Commercial Organisation, Economics, Banking and Sales Management for a period of three years from June 1961.

By order and in the name of the Governor of Maharashtra.

SI/-A N S
(V.B. Parulkar)
UNDER SECRETARY TO GOVERNMENT.

UNIVERSITY OF PUNA

Copy forwarded with compliments to the Principal, Shri Shivaji Mahavidyalaya Barshi for information.

Branch Office,
Pune-7
No. 11/321
Pune

ATTESTED

[Signature]
PRINCIPAL
Shri Shivaji Mahavidyalaya,
Barshi, Dist. Solapur.

3

2F and 2B Certificate

Ph. 23236351, 23232701, 23237721
23234116, 23235733, 23232317
23236735, 23239437, 23239627

Extension No. 413 (CPP-I Colleges)
UGC Website: www.ugc.ac.in
F. No. 1-1/2013 (CPP-I/C)



विश्वविद्यालय अनुदान आयोग
बहादुरशाह जफर मार्ग
नई दिल्ली-110 002
UNIVERSITY GRANTS COMMISSION
BAHADURSHAH ZAFAR MARG
NEW DELHI-110 002

December, 2014

The Principal,
Shri Shivaji Mahavidyalaya,
Barshi, Dist. Solapur - 413 411
Maharashtra

11 8 DEC 2014

Sub: - Recognition of Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur - 413 401
under Section 2 (f) & 12(B) of the UGC Act, 1956.

Sir,

With reference to the letter no.SSMB/SR/508(A) dated 21.08.2014 on the above subject, I am directed to say that the name of **Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur - 413 401** established in the year of **1960**, affiliated to **Shivaji University, Kolhapur** is included in the list of Colleges maintained under Section **2(f) & 12(B)** of the UGC Act, 1956 under the head **Non-Government** College teaching upto **Master's** Degree.

डॉ. अशोक. ए. शिंदे
श्री शिवाजी महाविद्यालय
बारशी, सोलापूर जिल्हा
चेअरमन
23/12/2014

Yours faithfully,

Charan Dass
(Charan Dass)
Under Secretary

Ann

S. S. Mahavidyalaya BARSHI
Inword No: <i>915</i>
Date: <i>23.12.14</i>

NAAC Certificate



राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद
विश्वविद्यालय अनुदान आयोग का स्वायत्त संस्थान
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL
An Autonomous Institution of the University Grants Commission

Certificate of Accreditation

*The Executive Committee of the
National Assessment and Accreditation Council
on the recommendation of the duly appointed
Peer Team is pleased to declare the
Shri Shivaji Mahavidyalaya, Barshi
Shivajinagar, Barshi, Dist. Solapur, affiliated to Solapur University,
Maharashtra as
Accredited
with CGPA of 3.14 on four point scale
at A grade
valid up to May 19, 2024*

Date : May 20, 2019



f. C. Dhanu
Director

EC/SC/48/RAJ/MBICDGN1168



राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद
विश्वविद्यालय अनुदान आयोग का स्वायत्त संस्थान
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL
An Autonomous Institution of the University Grants Commission

Quality Profile

Name of the Institution : Shri Shivaji Mahavidyalaya, Barshi

Place : Shivajinagar, Barshi, Dist. Solapur, Maharashtra

Criteria	Weightage (W _i)	Criterion-wise Weighted Grade Point (Cr WGP)	Criterion-wise Grade Point Averages (Cr WGP _i / W _i)
I. Curricular Aspects	100	305	3.05
II. Teaching-Learning and Evaluation	330	1002	3.04
III. Research, Innovations and Extension	116	402	3.47
IV. Infrastructure and Learning Resources	100	337	3.37
V. Student Support and Progression	110	380	3.45
VI. Governance, Leadership & Management	094	278	2.96
VII. Institutional Values and Best Practices	100	276	2.76
Total	$\sum_{i=1}^7 W_i = 950$	$\sum_{i=1}^7 (Cr WGP)_i = 2980$	

$$\text{Institutional CGPA} = \frac{\sum_{i=1}^7 (Cr WGP)_i}{\sum_{i=1}^7 W_i} = \frac{2980}{950} = \boxed{3.14}$$

Grade =



Date : May 20, 2019

S. C. [Signature]
Director

- This certification is valid for a period of Five years with effect from May 20, 2019
- An institutional CGPA on four point scale in the range of 3.51 - 4.00 denotes A⁺ grade, 3.26 - 3.50 denotes A⁺ grade, 3.01 - 3.25 denotes A grade, 2.76 - 3.00 denotes B⁺ grade, 2.51 - 2.75 denotes B⁺ grade, 2.01 - 2.50 denotes B grade, 1.51 - 2.00 denotes C grade
- Scores rounded off to the nearest integer

EC(SC)/40/RAJ/MHCOGN11698

Academic and Administrative Audit (AAA) certificate

प्रपत्र-अ

सोलापूर विद्यापीठ, सोलापूर.संलग्नित (अनुदानित) महाविद्यालयांना शैक्षणिक व प्रशासकीय मूल्यमापनामध्ये मिळालेले गुण व श्रेणी

अनु.क्र.	महाविद्यालयाचे नाव	शैक्षणिक व प्रशासकीय मूल्यमापनात प्राप्त झालेले गुण (३०० पैकी)	शैक्षणिक व प्रशासकीय मूल्यमापन प्राप्त झालेली टक्केवारी	श्रेणी
१.	प. आर. बुर्ला महिला वरिष्ठ महाविद्यालय, सोलापूर. २३३, साखर पेट (अशिकाल मैदान), पो.बॉ.नं. ५३०, सोलापूर. ४३३ ००५ Email: arburia@gmail.com Website: www.arburia.org	२२१	७६.३३%	A
२.	भाई छत्रसिंग चंदले कॉलेज ऑफ सोशल वर्क, सोलापूर. १६३ अ, रेवेलार्डन, जुना एम्प्लॉमेंट चौक, सोलापूर. ४३३ ००१ Email: bcmwsoolapur@gmail.com Website: www.chandalecollegeofsocialwork.com	११७	३९.०%	E
३.	छत्रपती शिवाजी नाईट कॉलेज ऑफ आर्टस् ॐन्ड कॉमर्स, सोलापूर. १०१- ब, मुराजी पेट, सोलापूर. ४३३ ००१. Email: csnc_123@yahoo.co.in Website: http://shivajinightcollege.org	२०५	६८.३३%	B
४.	डी.बी.एफ. दयानंद कॉलेज ऑफ आर्टस् ॲन्ड सायन्स, सोलापूर. दयानंद नगर, रविवार पेट, सोलापूर. ४३३ ००२	२७४	९१.३३%	A



I/c. Principal

Shri Shri Mahavidyalaya, Barshi.

२०.	कॉलेज ऑफ एजुकेशन, बारशी. ता. बारशी, जि. सोलापूर. ४३३ ४३१ Email: bedbarshi@yahoo.com Website: www.coebarsshi.org	२७३	११.०%	A
२१.	राजर्षि शाहू लॉ कॉलेज, बारशी. ता. बारशी, जि. सोलापूर. ४३३ ४३१ Email: rslawbarshi@gmail.com Website: www.rslawcollegebarshi.org	१६५	५७.२९%	C
२२.	श्री. शिवाजी महाविद्यालय, बारशी. ता. बारशी, जि. सोलापूर. ४३३ ४३१ Email: ssmb_barshi@rediffmail.com Website: www.ssmbarshi.org	२७३	११.०%	A
२३.	श्रीमान भाऊसाहेब झाडबुके महाविद्यालय, बारशी. झाडबुके मार्ग, बारशी. ता. बारशी, जि. सोलापूर. ४३३ ४०३ Email: principalsbzm@rediffmail.com	१९४	६४.६६%	B
२४.	सी. सुवर्णलता गांधी महाविद्यालय, बैरग. ता. बारशी, जि. सोलापूर. ४३३ ४०२ Email: sgm.123@gmail.com	२०३	६७.६६%	B
२५.	भारत महाविद्यालय, जेऊर (म.रेले), ता. करमाळा. जि. सोलापूर. ४३३ २०२ Email: prinbmjeur@gmail.com bharatmjeur_2007@rediffmail.com Website: www.bharatmjeur.com	२०७	६९.०%	B
२६.	यशवतराय चव्हाण महाविद्यालय, करमाळा. ता. करमाळा, जि. सोलापूर. ४३३ २०३ Email: ycmkarmala@gmail.com Website: www.ycmkarmala.org	१९०	६३.३३	B
२७.	प्रतापसिंह मोहिते पाटील महाविद्यालय, करमाळा. ता. करमाळा, जि. सोलापूर. ४३३ २०३ Email: pmpp_college123@yahoo.com Website: www.pmpcollege.com	१२५	४१.६६%	D
२८.	शंकरराव मोहिते महाविद्यालय, अकलूज. ता. माळशिरस, जि. सोलापूर. ४३३ १०३	२३२	७७.३३%	A
२९.	सहकार महर्षि शंकरराव मोहिते-पाटील महाविद्यालय, नातपुते. ता. माळशिरस, जि. सोलापूर. ४३३ १०६ Email: vmp_college@yahoo.co.in Website: www.vmpmahavidyalaya.co.in	१९१	६३.६६%	B



U.C. Principal
Shri Shitaji Mahavidyalaya, Barshi.

Best College award certificate



NIRF Ranking certificate

2/2/2019

MHRD, National Institute Ranking Framework (NIRF)

Gallery | Login |



National Institutional Ranking Framework
Ministry of Human Resource Development
Government of India



HOME

ABOUT NIRF

PARAMETERS

DOCUMENTS

RANKING

NOTIFICATION/ADVT

FAQS

CONTACT

India Rankings 2017: College (Rank-band: 101-150)

Institution list in alphabetical order

Name	City	State
Ahmednagar Jilha Maratha Vidya Prasarak Samajs New Arts Commerce & Science College	Parner	Maharashtra
Anumugam Pillai Seethal Ammal College	Shvagangal	Tamil Nadu
Ashok & Rita Patel Institute of Integrated Study & Research in Biotechnology and Allied Sciences	Vithal Udyognagar	Gujarat
Bapatla College of Arts & Science	Guntur	Andhra Pradesh
Bharati Vidyapeeth's Dr. Patangarao Kadam Mahavidyalaya	Sangli	Maharashtra
Bharati Vidyapeeth's Institute of Environment Education & Research	Pune	Maharashtra
Chaitanya Degree College	Warangal	Telangana
D.A.V. College for Girls	Yamuna Nagar	Haryana
DAV College	Chandigarh	Chandigarh
Dhananjayrao Gadgil College of Commerce	Satara	Maharashtra
Dnyanprassarak Mandal's College and Research Centre	Goa	Goa
Dr Lankapalli Bullayya P.G. College	Vsakhapatnam	Andhra Pradesh
Dr. R.V. Arts and Science College	Coimbatore	Tamil Nadu
Dr. G.Y.Pathrikar College of Computer Science and Information Technology	Aurangabad	Maharashtra
Fazi Ali College	Mokokchung	Nagaland
Government College	Rajahmundry	Andhra Pradesh
Government Degree College, Srisaifam Project	Kumool	Andhra Pradesh
Govt. Degree College	Kumool	Andhra Pradesh
Govt. Vidarbha Institute of Science & Humanities	Amravati	Maharashtra
Holkar Science College	Indore	Madhya Pradesh
J.M.J. College for Women	Guntur	Andhra Pradesh
Jagarlamudi Kuppaswamy Choultry College	Guntur	Andhra Pradesh
Jawaharlal Nehru Rajkeeya Mahavidyalaya	Port Blair	Andaman & Nicobar
Maharajah's College	Vizianagaram	Andhra Pradesh
Murgaon Education Society's College of Arts and Commerce	Goa	Goa
New Arts, Commerce and Science College	Ahmednagar	Maharashtra
P.B. Sidhartha College of Arts and Science	Vijayawada	Andhra Pradesh
Padmashri Vikhe Patil College of Arts, Science & Commerce	Ahmednagar	Maharashtra
Prabhas Degree College	Vijayawada	Andhra Pradesh
Raja Lakhama Gonda Science Institute	Belgaum	Karnataka
Rajarshi Shahu Mahavidyalaya	Latur	Maharashtra
Rosary College of Commerce and Arts	South Goa	Goa
S.V.R.M. College	Guntur	Andhra Pradesh
Sadguru Gadge Maharaja College	Satara	Maharashtra
Sangameshwar College	Solapur	Maharashtra
Saraswati Mahila Mahavidyalaya	Faridabad	Haryana
Shri Shwaji Mahavidyalaya	Solapur	Maharashtra

<https://www.nirfindia.org/2017/CollegeRanking150.html>

1/2

Name	City	State
Sri Bijivemula Veera Reddy Degree College	Badvel	Andhra Pradesh
Sri Guraljada Apparao Govt. Degree College	Visakhapatnam	Andhra Pradesh
Sri Ramakrishna Degree College	Nandyal	Andhra Pradesh
St. Joseph's Evening College	Bengaluru	Karnataka
St. Xavier's College	Ranchi	Jharkhand
Subharam Government Degree College	Punganur	Andhra Pradesh
Suryadatta College of Hospitality Management & Travel Tourism	Pune	Maharashtra
Swahid Peoli Phukan College	Sibsagar	Assam
Thasim Beevi Abdul Kader College for Women	Ramanathapuram	Tamil Nadu
The Quaid-E-Mileth College for Men	Kancheepuram	Tamil Nadu
Vasantha College for Women	Varanasi	Uttar Pradesh
Women's College	Tinsukia	Assam
Y.A. Govt. College for Women	Prakasam	Andhra Pradesh
Yashwantrao Mohite College of Arts, Science and Commerce	Pune	Maharashtra

DBT Star College award Letter-2017

No. BT/HRD/11/015/2017
Government of India
Ministry of Science & Technology
Department of Biotechnology

Block 2, 6-8th Floor
CGO Complex, Lodi Road
New Delhi - 110003
Dated: 25/05/2017

ORDER

Sanction of the President is hereby accorded under Rule 18 of the Delegation of Financial Power Rules, 1978 for the financial support for strengthening of Life Science and Biotechnology Education and Training at undergraduate level under Star College Scheme to **Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur – 413411 (M.S)** at a total project cost of **₹ 69.00 lakhs (Rupees sixty nine lakhs only)** for **three years** as per budget details are given below:-

Head	Amount (₹ In lakhs)			
	1 st Year rel	2 nd Year rel	3 rd Year rel	Total
<u>Non-Recurring</u> Equipment @ ₹ 5.00 lakhs per dept. (Physics, Chemistry, Botany, Zoology, Microbiology and Electronics)	30.00	0.00	0.00	30.00
<u>Recurring</u> to all six depts. @ ₹ 2.00 lakhs per year (Physics, Chemistry, Botany, Zoology, Microbiology and Electronics)	12.00	12.00	12.00	36.00
<u>Travel Grant (Mentoring, Monitoring and Site Visit)</u>	1.00	1.00	1.00	3.00
Total:	43.00	13.00	13.00	69.00

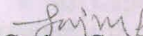
- Dr. V. M. Gurame, Assistant Professor, Department of Chemistry, Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur – 413411 (M.S)** will be the coordinator for this programme and will submit utilization certificate and statement of expenditure duly signed by him, finance/accounts officer of college and head of college in duplicate at the end of financial year.
- The college is required to implement the programme as per the terms and conditions given in **Annexure-I**.
- As per "Rule 236 (1) of GFR 2017", the Account of all Grantee Institution or Organisations shall be open to inspection by the sanctioning authority and audit, both by the Comptroller and Auditor General of India under the provision of CAG(DPC) Act 1971 and internal audit by the Principal Accounts Office of the Ministry or Department, whenever the institute or Organisation is called upon to do so.
- The expenditure involved is debitable to:

Demand No. 85	Department of Biotechnology
3425	Other Scientific Research (Major Head)
60	Others (Sub Major Head)
60.200	Assistance to Other Scientific Bodies (Minor Head)
29	Biotechnology Research and Development, Human Resource Development, Research Resources and facilities
29.17	Assistance for Research and Development
29.17.31	Grants-in-Aid General for the year 2017-18

Continue...2/-

Demand No. 85	Department of Biotechnology
3425	Other Scientific Research (Major Head)
60	Others (Sub Major Head)
60.200	Assistance to Other Scientific Bodies (Minor Head)
29	Biotechnology Research and Development, Human Resource Development, Research Resources and facilities
29.17	Assistance for Research and Development
29.17.35	Grants-in-Creation of Capital Assets


6. Non-recurring grant shall be utilized within 18 months of their release.
7. The institute/agency will keep the whole of the grant in a bank account earning interest, and the interest so earned should be reported to DBT in the utilization certificate and statement of expenditure. The interest so earned will be treated as a credit to the institute/agency and shall be adjusted towards further installment of the grant and/or at the time of final settlement of accounts.
8. No Utilization Certificate pertaining to this programme is required with the college as it is a first time grant to the grantee institution.
9. This issues under powers delegated to this Dept. and with the concurrence of IFD vide their **San No. 102/IFD/SAN/637/2017-18 dated:24.05.2017**
10. This sanction order has been noted at serial No...21.....In the register of grants.


(Dr. Garima Gupta)
Scientist-D

To,
The Pay & Accounts Officer
Department of Biotechnology
New Delhi-110003

Copy to:

1. The Principal, Director of Audit (Scientific Departments), AGCR Building, New Delhi-110002
2. Cash Section, DBT, (2 Copies)
3. The Principal, Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur – 413411 (M.S)
4. Dr. V. M. Gurame, Assistant Professor, Department of Chemistry, Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur – 413411 (M.S)
5. Sanction Folder


(Dr. Garima Gupta)
Scientist-D

DBT Star College Status award Email-2020

Welcome to Rediffmail: Inbox

https://f4mail.rediff.com/ajaxprism/readmail?printable=1&block_ima..

rediffmail

Mailbox of ssmb_barshi

Subject: 8th Meeting of the Task Force to review ongoing colleges supported under DBT-Star College Scheme” held on 25th -26th August 2020

From: Garima Gupta Scientist E <garima.g@nic.in> on Wed, 09 Dec 2020 13:31:58

To: vmgurame@gmail.com

Cc: "ssmb barshi" <ssmb_barshi@rediffmail.com>

7 attachment(s) - OM_regarding_refund_of_unspent_amount.pdf (1.33MB) , Procedure_for_NTRP.pdf (701.23KB) , Annexure_-_II_Supplementary_details_.pdf (7.05KB) , Format_of_equipment.pdf (164.03KB) , MOA_.pdf (80.84KB) , Statement_of_Expenditure.pdf (107.69KB) , UTILISATION_CERTIFICATE.pdf (69.61KB)

Dear Dr. Gurame, (Shri Shivaji Mahavidyalaya, Barshi)

This is with reference to the 8th Meeting of the Task Force to review ongoing colleges supported under DBT-Star College Scheme” held on 25th -26th August 2020. The comments/decisions by the Task Force are as below:

“Dr V M Gurame presented the progress of the college under Star College Scheme for six departments i.e. Physics, Chemistry, Botany, Zoology, Microbiology and Electronics, sanctioned on 25th May 2017 for a period of three years.

Task Force noted that the college has been able to conduct a variety of experiments and projects for the students and has also been conducting Advisory Committee / mentoring meetings in their college on regular basis. They have conducted several national conferences/ training programmes for the faculty and students during the tenure of Star Scheme. They also conducted “DBT Week” and conducted several activities to inculcate the scientific temper among the students. The overall performance was found to be very good considering the geographical location. The college has a team of committed faculty that was making commendable efforts.

In view of the above, the Task Force recommended awarding the Star Status the participating departments in the college with one-time non-recurring grant of Rs. 15.00 lakhs (per dept) and recurring grant of Rs. 5.00 lakhs per year per dept, contingency of Rs 1.00 lakhs per year and Travel of Rs 2.00 lakhs per year for a period of three years”.

Now, as per the above mentioned details, the college will be upgraded to Star Status and the support extended for another 3 years i.e. from 24.05.2020 to 24.05.2023. Therefore, you are requested to submit the following:

1. UC/SE for the FY 2019-20 (01.04.2019 to 31.03.2020) (as per the attached format)
2. MoA (extended period) from the date of completion to the date of extension i.e. 24.05.2020 to 24.05.2023.
3. In accordance with Rule 230 (8) of GFR 2017, All interest or other earnings against Grants in Aid or advances (other than reimbursement) release to any Grantee institution should be mandatory remitted to the Consolidated Fund of India immediately after finalization of the accounts. Such

1 of 2


Co-Ordinator
DBT-Star College
Shri Shivaji Mahavidyalaya, Barshi




PRINCIPAL
Shri Shivaji Mahavidyalaya,
Barshi, Dist. Solapur-413411

12/31/2020 5:32 P

महाराष्ट्र शासन

उच्च व तंत्र शिक्षण विभाग

राष्ट्रीय सेवा योजना

राज्यस्तरीय पुरस्कार

प्रमाणपत्र

प्रमाणित करण्यात येते की,

श्री शिवाजी महाविद्यालय, बारशी
(सीलापूर विद्यापीठ, सीलापूर)

यांना राष्ट्रीय सेवा योजनांतर्गत उत्कृष्ट कार्य

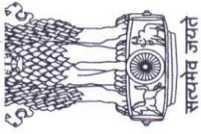
केल्याबद्दल वर्ष २०११-२०१२ चा

उत्कृष्ट एकक महाविद्यालयीनस्तर पुरस्कार

प्रदान करण्यात येत आहे.

A

राज्य संपर्क अधिकारी व
विशेष कार्य अधिकारी, राष्ट्रीय सेवा योजना
State Liaison Officer
Officer on Special Duty, NSS Cell



GOVERNMENT OF MAHARASHTRA

HIGHER & TECHNICAL EDUCATION DEPARTMENT

NATIONAL SERVICE SCHEME

STATE LEVEL AWARD

Merit Certificate

This is to certify that

Shri Shivaji Mahavidyalaya, Barshi
(Solapur University, Solapur)

has been awarded State Level

Best College NSS Unit Award

for the outstanding contribution towards

NSS programmes for the year 2011-2012.

h

प्रधान सचिव
उच्च व तंत्र शिक्षण विभाग
Principal Secretary
Higher & Technical Education

ATTESTED

PRINCIPAL
Shri Shivaji Mahavidyalaya,
Barshi, Dist.Solapur.



Endorsement from PI and Summary Sheet for FIST-2021

Application for [please tick one] : **LEVEL 0**

- Name of the College (for Level 0):

Shri Shivaji Mahavidyalaya Barshi, Solapur

- Year of Establishment: **1960.**
- Address for correspondence including Telephone, Telegram, FAX, e-mail etc.

Shivajinagar, Barshi, Tal. Barshi
Dist. Solapur, Maharashtra, INDIA-413411
Telephone: 02184-222382
Fax: 02184-222382
Email: ssmb_barshi@rediffmail.com
Website: www.ssmbarshi.org.in

- Program Co-ordinator:

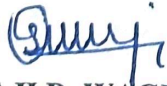
Dr. Shivaji Devrao Waghmare
Assistant Professor
Department of Physics
E-mail: shivajiwaghmare1985@gmail.com

- Status of the College (attach supporting documents)
 - Academic Status [College (Affiliated/ Autonomous/ Constituent) or Institute/University/Deemed University]
**Affiliated to Punyashlok Ahilyadevi Holkar Solapur University,
Solapur, MH-413255**
 - Financial Status [Government (Central or State Govt.)/ Govt. Aided / Private Colleges]

Government aided

- Total budget: **1,49,99,285/-**

Information as above is true and is correct.



DR. SHIVAJI D. WAGHMARE

(Program coordinator)



DR. PRAKASH R. THORAT

PRINCIPAL
(Seal and Signature of Principal of the College)
Barshi, Dist. Solapur-413411.



DEPARTMENT OF SCIENCE AND TECHNOLOGY
POLICY ON CONFLICT OF INTEREST

FOR REVIEWER & COMMITTEE MEMBER or APPLICANT or DST OFFICER ASSOCIATED/ DEALING WITH
THE SCHEME/ PROGRAM OF DST

Issues of Conflicts of Interest and ethics in scientific research and research management have assumed greater prominence, given the larger share of Government funding in the country's R & D scenario. The following policy pertaining to general aspects of Conflicts of Interest and code of ethics, are objective measures that is intended to protect the integrity of the decision making processes and minimize biasness. The policy aims to sustain transparency, increase accountability in funding mechanisms and provide assurance to the general public that processes followed in award of grants are fair and non-discriminatory. The Policy aims to avoid all forms of bias by following a system that is fair, transparent and free from all influence/ unprejudiced dealings, prior to, during and subsequent to the currency of the programme to be entered into with a view to enable public to abstain from bribing or any corrupt practice in order to secure the award by providing assurance to them that their competitors will also refrain from bribing and other corrupt practice and the decision makers will commit to prevent corruption, in any form, by their officials by following transparent procedures. This will also ensure a global acceptance of the decision making process adopted by DST.

Definition of Conflict of Interest:

Conflict of Interest means "any interest which could significantly prejudice an individual's objectivity in the decision making process, thereby creating an unfair competitive advantage for the individual or to the organization which he/she represents". The Conflict of Interest also encompasses situations where an individual, in contravention to the accepted norms and ethics, could exploit his/her obligatory duties for personal benefits.

1. **Coverage of the Policy:**

- a) The provisions of the policy shall be followed by persons applying for and receiving funding from DST, Reviewers of the proposal and Members of Expert Committees and Programme Advisory Committees. The provisions of the policy will also be applicable on all individuals including Officers of DST connected directly or indirectly or through intermediaries and Committees involved in evaluation of proposals and subsequent decision making process.
- b) This policy aims to minimize aspects that may constitute actual Conflict of Interests, apparent Conflict of Interests and potential Conflict of Interests in the funding mechanisms that are presently being operated by DST. The policy also aims to cover, although not limited to, Conflict of interests that are Financial (gains from the outcomes of the proposal or award), Personal (association of relative / Family members) and Institutional (Colleagues, Collaborators, Employer, persons associated in a professional career of an individual such as Ph.D. supervisor etc.)

2. **Specifications as to what constitutes Conflict of Interest.**

Any of the following specifications (non-exhaustive list) imply Conflict of Interest if,

- (i) Due to any reason by which the Reviewer/Committee Member cannot deliver fair and objective assessment of the proposal.
- (ii) The applicant is a directly relative# or family member (including but not limited to spouse, child, sibling, parent) or personal friend of the individual involved in the decision making process or alternatively, if any relative of an Officer directly involved in any decision making process / has influenced interest/ stake in the applicant's form etc..
- (iii) The applicant for the grant/award is an employee or employer of an individual involved in the process as a Reviewer or Committee Member; or if the applicant to the grant/award has had an employer-employee relationship in the past three years with that individual.
- (iv) The applicant to the grant/award belongs to the same Department as that of the Reviewer/Committee Member.
- (v) The Reviewer/Committee Member is a Head of an Organization from where the applicant is employed.
- (vi) The Reviewer /Committee Member is or was, associated in the professional career of the applicant (such as Ph.D. supervisor, Mentor, present Collaborator etc.)
- (vii) The Reviewer/Committee Member is involved in the preparation of the research proposal submitted by the applicant.
- (viii) The applicant has joint research publications with the Reviewer/Committee Member in the last three years.
- (ix) The applicant/Reviewer/Committee Member, in contravention to the accepted norms and ethics followed in scientific research has a direct/indirect financial interest in the outcomes of the proposal.
- (x) The Reviewer/Committee Member stands to gain personally should the submitted proposal be accepted or rejected.

The Term "Relative" for this purpose would be referred in section 6 of Companies Act , 1956.

3. **Regulation:**

The DST shall strive to avoid conflict of interest in its funding mechanisms to the maximum extent possible. Self-regulatory mode is however recommended for stake holders involved in scientific research and research management, on issues

pertaining to Conflict of Interest and scientific ethics. Any disclosure pertaining to the same must be made voluntarily by the applicant/Reviewer/Committee Member.

4. **Confidentiality:**

The Reviewers and the Members of the Committee shall safeguard the confidentiality of all discussions and decisions taken during the process and shall refrain from discussing the same with any applicant or a third party, unless the Committee recommends otherwise and records for doing so.

5. **Code of Conduct**

5.1 **To be followed by Reviewers/Committee Members:**

- (a) All reviewers shall submit a conflict of interest statement, declaring the presence or absence of any form of conflict of interest.
- (b) The reviewers shall refrain from evaluating the proposals if the conflict of interest is established or if it is apparent.
- (c) All discussions and decisions pertaining to conflict of interest shall be recorded in the minutes of the meeting.
- (d) The Chairman of the Committee shall decide on all aspects pertaining to conflict of interests.
- (e) The Chairman of the Committee shall request that all members disclose if they have any conflict of interest in the items of the agenda scheduled for discussion.
- (f) The Committee Members shall refrain from participating in the decision making process and leave the room with respect to the specific item where the conflict of interest is established or is apparent.
- (g) If the Chairman himself/herself has conflict of interest, the Committee may choose a Chairman from among the remaining members, and the decision shall be made in consultation with Member Secretary of the Committee.
- (h) It is expected that a Committee member including the Chair-person will not seek funding from a Committee in which he/she is a member. If any member applies for grant, such proposals will be evaluated separately outside the Committee in which he/she is a member.

5.2 **To be followed by the Applicant to the Grant/Award:**

- (a) The applicant must refrain from suggesting referees with potential Conflict of Interest that may arise due to the factors mentioned in the specifications described above in Point No. 2.
- (b) The applicant may mention the names of individuals to whom the submitted proposal should not be sent for refereeing, clearly indicating the reasons for the same.

5.3 **To be followed by the Officers dealing with Programs in DST:**

While it is mandatory for the program officers to maintain confidentiality as detailed in point no. 6 above, they should declare, in advance, if they are dealing with grant applications of a relative or family member (including but not limited to spouse, child, sibling, parent) or thesis/ post-doctoral mentor or stands to benefit financially if the applicant proposal is funded. In such cases, DST will allot the grant applications to the other program officer.

6. **Sanction for violation**

3.1 **For a) Reviewers / Committee Members and b) Applicant**

Any breach of the code of conduct will invite action as decided by the Committee.

3.2 **For Officers dealing with Program in DST**

Any breach of the code of conduct will invite action under present provision of CCS (conduct Rules), 1964.

7. **Final Appellate authority:**

Secretary, DST shall be the appellate authority in issues pertaining to conflict of interest and issues concerning the decision making process. The decision of Secretary, DST in these issues shall be final and binding.

8. **Declaration**


I have read the above "Policy on Conflict of Interest" of the DST applicable to the Reviewer/ Committee Member/ Applicant/ DST Scheme or Program Officer # and agree to abide by provisions thereof.

I hereby declare that I have no conflict of interest of any form pertaining to the proposed grant *

I hereby declare that I have conflict of interest of any form pertaining to the proposed grant *

* & # (Tick whichever is applicable)

Name of the Reviewer/ Committee Member or Applicant or DST Officer
(Strike out whichever is not applicable)


Dr. Shivaji D. Waghmare
(Program coordinator)




Dr. Prakash R. Thorat
(Seal and Signature Principal of the College)
PRINCIPAL
Shri Shivaji Mahavidyalaya,
Barshi, Dist. Solapur-413411.



Shri Shivaji Shikshan Prasarak Mandal Barshi's

Shri Shivaji Mahavidyalaya, Barshi

Shivajinagar, Barshi. Dist. Solapur Maharashtra, INDIA - 413 411

(NAAC Reaccredited 'A' Grade)

UGC, New Delhi Approved Community College | Solapur University -AAA, 'A' Grade with 91% Marks
DBT, MST, India, Approved STAR College | NIRF, MHRD, India, Ranked among the First 150 Colleges



Prin. Dr. Prakash R. Thorat
M.Sc., M. Phil., Ph. D.

Office : 02184 - 222382
Fax : 02184 - 222382

Web : www.ssmbarshi.org
Email : ssmb_barshi@rediffmail.com

Outward No : SSMB/348

Date : 03-09-2021

Endorsement Letter from the Principal of the College

This is to certify that:

- I. **Dr. Prakash R. Thorat**, the Principal of the College **Shri Shivaji Mahavidyalaya Barshi, Solapur, MH** will assume full responsibility for implementing this project proposed under FIST Program of the Department of Science and Technology, New Delhi during **2021-2026**.
- II. The date of starts of the Project from the date on which the University/Institute receives the bank draft/cheque/RTGS from the Department of Science & Technology.
- III. The Head or Coordinator will be governed by the rules and regulations of the University/Institute and will be under administrative control of the University/Institute for the duration of the FIST project.
- IV. The grant-in-aid by the Department of Science & Technology will be used to meet the expenditure on the FIST project and for the period for which the project has been sanctioned as indicated in the sanction letter/ order.
- V. No administrative or other liability will be attached to the Department of Science & Technology at the end of the FIST project.
- VI. The University/ Institute will provide basic infrastructure and other required facilities to the investigator for implementing the FIST project.
- VII. The University/ Institute will take into its books all assets received under this sanction and its disposal would be at the discretion of Department of Science & Technology.
- VIII. Institute assumes to undertake the financial and other management responsibilities of the FIST project.
- IX. Organizing institute will participate in the monitoring/ reviewing of the FIST Project whenever they were asked to do so.



Seal and Signature Principal of the College
Shri Shivaji Mahavidyalaya,
Barshi, Dist. Solapur-413411

Ref: ICON/WR/SSM/26082021

Date: 26th August 2021

To,
The Principal,
Shri Shivaji Mahavidyalaya Barshi,
Karmveer Dr. Mamasahab Jagdale Road, Shivajinagar, Barshi.
District: Solapur, State: Maharashtra.
Pin code: 413411

Sub: Quotation for Tabletop Scanning Electron Microscope along with EDS option

Dear Sir,

With pleasure we are hereby introduce ourselves as ICON Analytical Equipment Pvt Ltd! We represent our principal Thermo Fisher Scientific across India for Electron Microscope. In continuation to the same, we are glad to provide you with the quotation for Tabletop Scanning Electron Microscope Model Phenom G6 Pure.

Kindly go through the details in the following pages and feel free to revert for any further clarification.

Looking forward for your valuable order that will attract the best of our attention and support!

We trust that our offer is in line with your requirements.

Thanking you.

Yours faithfully,

For Icon Analytical Equipment Pvt Ltd.



Amit S. Bhojane
National Manager – Sales





Ref: ICON/WR/SSM/26082021

Date: 26th August 2021

To,
The Principal,
Shri Shivaji Mahavidyalaya Barshi,
Karmveer Dr. Mamasahab Jagdale Road, Shivajinagar, Barshi.
District: Solapur, State: Maharashtra.
Pin code: 413411

Sub: Quotation for Tabletop Scanning Electron Microscope along with EDS option

Sr. No.	Part no.	Description	Qty	Price in INR
1	1193913	Phenom G6 Pure + SED - Phenom G6 Pure system with default BSE-detector allows for a sample size of 25 mm (d) and 35 mm (h) and includes a motorized XY stage. The optical camera automatically creates a high resolution image for easy sample navigation. Standard peripherals such as a pre-vacuum pump, power supply, 24" monitor, powerful workstation, one sample holder (manual height adjustable), keyboard, mouse and a Sample Preparation Starter Kit are included. The SED is included and allows fully integrated detection of secondary electrons for surface characterization. SE images can be mixed with BSE images in live view. Magnification range optical: 27x Magnification range SEM: 160 – 175,000x Acceleration voltages: presets at 5kV and 10kV. Upgradeable with EDS detector and ProSuite application software. Optional available sample holders: charge reduction, resin mount, tilt&rotation, temperature controlled, core plug and electrical feedthrough. Upgrade towards Phenom G6 Pro specifications at a Thermo Fisher Scientific authorized Service Center is possible.	1	
2	PW-600-002	Charge reduction holder for 3.5mm pin stubs.		
			Price in INR	₹ 57,92,130.00
			GST 18%	₹ 10,42,583.40
			F.O.R. price in INR	₹ 68,34,713.40

Thanking you.

Yours faithfully,

For Icon Analytical Equipment Pvt Ltd.



Amit S. Bhojane
National Manager – Sales



TERMS AND CONDITIONS

Payment:	In INR. F.O.R
Purchase Order	Your Purchase Order to be in favor of: Icon Analytical Equipment Pvt Ltd 301, LANDMARK, 554, Dr. G. M. Bhosale Marg, Worli, Mumbai – 400 018.
Payment Terms	100% advance against Perform Invoice
Bank Details	Name of the Bank: Kotak Mahindra Bank Ltd. Branch with complete postal address 925-Sea Sequence, Appasaheb Marathe Marg, Prabhadevi, Mumbai - 400 025 Beneficiary Name: Icon Analytical Equipment Pvt Ltd Account Type: O/D Account, Account Number: 1412785271 RTGS/NEFT IFSC Number: KKBK0000963
Delivery	Within 10-12 weeks after the Order is acknowledged & 100% advance payment is received subject to export clearance.
Installation and training	Will be done free of cost by our trained service engineers of Icon Analytical Equipment On-site training will be provided to your operators.
Warranty	Warranty for equipment quoted is 12 months from the date of installation / commissioning or 13 months from the date of shipment whichever is earlier. ▪ Covers the parts and labor of a warranty repair done at Seller's site. ▪ Excludes consumables ▪ Freight charges and shipments to Seller are Buyer's responsibility. NOTE: Seller assumes no liability under the above warranties for equipment or system failures resulting from negligence, misuse, Accident, misapplication, modification, mishandling or force majeure.
Validity:	Up to 30 st Sep 2021
Spares Availability	The supply of spares is guaranteed for 7 years from the date of last manufacture and will not be applicable for computers, printers or any such 3rd party items where the manufacturer does not offer this as a policy
Scope of Supply	The scope of supply will be as per the final offer only. Items not mentioned in the final offer cannot be supplied
Software Updates	We will provide free of charge software updates while under warranty only to the extent necessary to enable the system to perform to the original specifications. Any software updates or packages that improve performance or specifications beyond the original specifications are available at an additional cost



Indemnities	We will discuss and mutually agree/disagree on the following points: Liquidated Damages (LD) Clause; Penalties; Submission of Designs & Drawings; Intellectual Property Rights & Indemnities and any other points that arise during the tender/procurement process.
AMC (Labour Only)	The charges for one-year AMC (Labor only) is 3% of the total cost of the system for the first year after the warranty with an increase up to 10% every year thereof. We will provide 2 Preventive Maintenance visits and unlimited Breakdown visits.
Export Control	Supply of Equipment is subject to export control. Buyer will not export or re-export, either directly or indirectly, any Equipment or system incorporating such Equipment without first obtaining any required license or other approval from the appropriate host government, other applicable authorities, including but not limited to the U.S. Department of Commerce (or any other agency or department of the U.S. Government with appropriate authority), the Dutch Ministry of Foreign Affairs and Czech Ministry of Industry and Trade (MPO); and/or from original manufacturer or ICON when applicable. If the delivery of products, services and/or documentation becomes (1) subject to export license, or (2) restricted or prohibited due to (changed) regulations, Original Manufacturer may suspend its obligations and/or terminate the relevant order in all cases without incurring any liability towards the Buyer.
Country of Origin	EEC, The Netherlands, Czech Republic and others

**Thanking you.
Yours faithfully,
For Icon Analytical Equipment Pvt Ltd.**



**Amit S. Bhojane
National Manager – Sales**



QUOTATION	
The Principal,	Ref : VIA/2021-22/0902203
Shri Shivaji College, Barshi	Date : 02-09-2021
Solapur	Kind Attn: Shri, Shivaji
MH, India	Email: shivajiwaghmare1985@gmail.com ; +91-9850490823

Dear Sir,

Please find below the quotation for the Double Beam Touch Screen UV Visible Spectrophotometer

Sr. No.	Description	Qty.	Price in Rs.	Amt. in Rupees
1.	Microprocessor Based Double Beam UV Visible Spectrophotometer with 2901 with 8" Colour Touch Screen Wavelength : 190- 1100nm Band Width: 1 nm	1	2,95,000.00	2,95,000.00
				2,95,000.00
IGST Concessional rate @ 5%				14,750.00
Total Amount				3,09,750.00

Terms & Conditions:

1. Price: FOR Solapur
2. Taxes: GST included on the above Price
3. Delivery: 3-4 Weeks
4. Payment: 100% Advance along with the order
5. Validity: 30 days
6. Warranty: 12 months against manufacturing defect.

Yours truly,
For V Instek Analytical

Madhusri Hingde

Authorised Signatory

Note: Please go through the catalogue for the detailed Specifications

Eagle Instruments & Components

341, Kharak Mangoli, Old Panchkula,
Panchkula, Haryana, India, 134108
+91-7340749506
eagleinstruments23@yahoo.com
GSTIN : 06CUZPS7343M1ZG

Date: 02/09/21

To
The Principal

Quotation ID: Q-DoubleBeam-0209-1949


Shri Shivaji Mahavidyalaya ,
Barshi, Solapur Pune, Maharashtra,
India

Subject: Quotation for Double Beam UV VIS Spectrophotometer -1 No. and FTIR-Spectrophotometer with Software -01 No.

Respected Sir/ Madam,

Ref: Your enquiry for Double Beam UV VIS Spectrophotometer and FTIR-Spectrophotometer with Software dated: 02/09/2021

Thank you for showing interest in our products & contacting us. Please find our exclusive quotation for your requirement of Double Beam UV VIS Spectrophotometer and FTIR-Spectrophotometer with Software

S.No	Product Description	Product Image	Qty	Price / Unit	Total Amount
1	5500 (FTIR-Spectrometer With Software), Size: Standard Brand: Eagle Instruments Model Name/Number: 5500 (FTIR-Spectrometer With Software)		1	Rs 1,599,999.00 / Number	Rs 1,599,999.00
2	Double Beam UV VIS Spectrophotometer Brand: Eagle Instruments Double Beam UV VIS Spectrophotometer	--	1	Rs 270,000.00 / Number	Rs 270,000.00
Sub Total :					Rs 1,869,999.00

	GST (18%):	Rs 3,36,599.82
	Shipping charges :	Rs 3,000.00
	Grand Total :	Rs 22,09,598.82

Rs. Twenty two lakh nine thousand five hundred ninety eight only.

Technical details as per attached catalogue

Terms and Conditions

Applicable Taxes : 18%
Shipping Charges : Rs 3000
Delivery Period : 7 Days
Payment Terms : 100% advance payment.
Remarks : Warranty one year.
Installation : Installation free of cost.
Validity : Validity 03 Month.

We look forward your valuable order.

Sincerely yours,

Avtar Singh

7340749506, 9915301473, 08047023504

<https://www.indiamart.com/eagleinstrumentsandcomponents/>



SINSIL INTERNATIONAL PVT LTD

G-8/G-4, New Brahmmand Annex
Phase - 8, Azad Nagar
Thane (w) - 400 607, Mumbai
www.sinsilinternational.com

Telephone : +91 22 4964 1927

(M) : 09833011933

Email : mumbai@sinsil.in

Quotation # PET/21/09/03

September 03, 2021

Prof.Shivaji Waghmare
shivajiwaghmare1985@gmail.com
9850490823

To,
The Principal,
Shri shivaji mahavidyalaya, Barshi
Maharashtra

Items	Model #	Description	Qty.	Total Price, ₹
1.	SS30AAA	Model of SS30AAA, a class AAA Solar Simulator at one (1) sun, with 30mmX30mm area of illumination. The COMPLETE model of SS30AAA system includes: 1- Light Source with Light Intensity Feedback to provide more stable output. 2- Manual and Automatic Shutter Control. 3- A 120 or 210 VAC, 50/60 Hz, Single Phase Power Supply. 4- Air Mass Filter of AM1.5 Global. 5- Electro-Mechanical controller mounted on the front panel. 6- Plateform underneath the SS30AAA for smaple placement. 7- Reference cell and voltmeter for intensity adjustment of the system. 8- Cables, safety & Adjustment tools, Operating manual, and a two (2) year warranty.	1	25,08,000.00
2	Basic IV measurement	Max. current range(A) ± 1 Max voltage Range (V) ± 200 Max.power (W) 20 Measurement Resolution: 16 bit Basic s/w to measure Isc, Voc, Im, Vm, Pm & FF Computer Interface for Keithley IV source	1	Included
Total Price in Rs.				25,08,000.00
IGST @ 18%				4,51,440.00
Total door delivery Price				29,59,440.00

Terms & Conditions: -

1. Payment: 100% advance payment in favor of Sinsil International Pvt Ltd.

Bank details

Name of A/c: SINSIL INTERNATIONAL PVT LTD
Bank Name: The KarurVysya Bank Limited
KVB A/c No: 2204135000001840
IFSC Code:KVBL0002204
Name & Address of the Bank: THE KARUR VYSYA BANK, SIDCUP TOWER
RACE COURSE, VADODRA- 390 007, Ph. 0265 - 2331658 / 2338582

All the Bank Charges are on the Account of Purchaser

2 Delivery: 90 days

3 Validity: 120 days

Regd. Office: 165 Parishram Park, Gorwa, Vadodara-390016 GST NO.: 24AAVCS3020N1Z0 Dated. 26/06/2017

Bangalore Ph: 09341282569 email:Bangalore@Sinsil.In

Vadodara Ph: 09167404043 email:Vadodara@sinsil.in

Delhi Ph : 09376224181 email:Delhi@Sinsil.In

Kolkata Ph: 09331043269 email: Kolkata@Sinsil.In

Chennai Ph: 09342266722 email:Chennai@Sinsil.In

Hyderabad Ph: 08008999507 email: Hyderabad@Sinsil.In



SINSIL INTERNATIONAL PVT LTD

G-8/G-4, New Brahmmand Annex
Phase - 8, Azad Nagar
Thane (w) - 400 607, Mumbai
www.sinsilinternational.com

Telephone : +91 22 4964 1927

(M) : 09833011933

Email : mumbai@sinsil.in

4. GST No. 24AAVCS3020N1Z0

5. Warranty: One year excluding accessories

For Sinsil International Pvt. Ltd.

Ms.Sindhu Ramesh
Product In-charge
(M)- 09167404043
Email: sindhu@sinsil.in



G. G. Technologies®

Manufacturer of
Hospital, Institute, Industries, Agriculture,
Pharmaceutical lab Testing Equipments

QUOTATION

NAME & ADDRESS OF BUYERS TO THE PRINCIPAL SHRI SHIVAJI COLLEGE BARSI SOLAPUR maharashtra CONTACT –SHIVAJI -9850490823 Email : shivajiwaghmare1985@gmail.com	DATED: 03.09.2021 REF. NO: GGT/21-22/SEP/0309 COMPANY NAME: G.G. TECHNOLOGIES ADDRESS: J-II/86 Sanjay Market, Wazirpur Main Road, Delhi 110052 GSTIN NO: 07ABSPH3785N1ZT PAN NO: ABSPH3785N Buyers Enquiry: Through India mart
--	---

SUBJECT: Quotation for Lab Equipment “ZEXTER”

Greetings,

Thank you for your valuable enquiry. This is with reference to your enquiry for LAB EQUIPMENTS “Zexter “as per your Specification, we are pleased to submit our quotation for the same.

S.NO	PARTICULARS	BRAND	QTY	PRICE EACH	AMOUNT
01	LYOPHILIZER -50 DEGREE	ZEXTER	01 NOS	214500	214500
	TOTAL				214500
	GST 18%				38610
	GRAND TOTAL				253110

TERMS & CONDITIONS:-

- Prices: **neft_ex_godown Delhi & in Indian rupees**
- Taxes: **GST @ 18% extra**
- Delivery period: **7-10 days**
- Payment: **50% advance, balance before dispatched**
- Other charges: **Installation, freight, forwarding and packing charges extra as per actual (if required)**
- Warrantee: **1 year warrantee from the date of delivery**

**We hope you will find the product as per your requirements and await to your valuable order.
Thanking you for your time and looking forward to working with you**

**Regards,
Preety**

**Office Coordinator,
GG Technologies**

BANK DETAILS

ICICI BANK :

FIRM NAME-G.G TECHNOLOGIES

BANK NAME-ICICI BANK,ASHOK VIHAR,PH-II DELHI-110052

CA A/C NO-033105001062

RTGS/NEFT/IFSC CODE-ICIC0000331



E-mail: ggtechnology@hotmail.com, ggtechnology@gmail.com **Website:** www.zexterindia.com
Office landline: +91-11-47098564 **Fax:** +91-11-47098564 **Telephone:** +91-9873067889, 8595224635
Regd. address: J-II/86, Sanjay Market, Wazirpur, Delhi-110052
Corp. Address: J-II/18, Sanjay Market, Wazirpur, Delhi-110052

ESTIMATE



Chemo Equip Corporation

15, Sakar Plaza, Ganesh Nagar,
Opposite Malpani Lawns,
SANGAMNER, Sangamner,
Maharashtra 422605
02425226439
chemoequip@gmail.com

GSTIN 27APFPM6224A1Z9 Estimate Date 02/09/2021
State 27-Maharashtra Estimate No. QT33
PAN APFPM6224A Reference No. DST

Customer Name

The Principal, Shree Shivaji Mahavidyalaya,
Barshi

Customer GSTIN

-

Billing Address

The Principal, Shree Shivaji
Mahavidyalaya, Barshi
Karmaveer Dr. Mamasheeb Jagdale Rd.
Shivaji Nagar, Barshi
Maharashtra, 413401
India

Shipping Address

The Principal, Shree Shivaji
Mahavidyalaya, Barshi
Karmaveer Dr. Mamasheeb Jagdale Rd.
Shivaji Nagar, Barshi
Maharashtra, 413401
India

Place of Supply 27-Maharashtra

Expiry Date 01/04/2022

Item	HSN / SAC	Quantity	Rate / Item (₹)	Discount Rate (%)	Taxable Value (₹)	CGST (₹)	SGST / UTGST (₹)	CESS (₹)	Total (₹)
1. Guoy's Method for Variety of Samles GM 02	9023	1.00 SET	2,48,500.00	10.00%	2,23,650.00	20,128.50 @9%	20,128.50 @9%	0.00	2,63,907.00
2. Installation	9987	1.00 UNT	2,500.00	0.00%	2,500.00	225.00 @9%	225.00 @9%	0.00	2,950.00
3. Transport By Road	9968	1.00 PCS	1,200.00	0.00%	1,200.00	108.00 @9%	108.00 @9%	0.00	1,416.00
Total					2,27,350.00	20,461.50	20,461.50	0.00	2,68,273.00

Taxable Amount ₹ 2,27,350.00

Total Tax ₹ 40,923.00

Total Value ₹ 2,68,273.00

Total amount (in words)

Two Lakh Sixty Eight Thousand Two Hundred Seventy Three Rupees Only

Bank Details:

Account Number 031959238569 IFSC SBIN0013276
Bank Name: State Bank Of India Branch Name: Janata Raja Road, Sangamner

For Chemo Equip Corporation

Authorised Signatory

Terms & Conditions:

Price The above quoted prices are net Ex-works & Subject to change without prior notifications
Payment 100% against delivery otherwise interest @24% Per anum will be applicable from due date/
Tax Extra at actual
Jurisdiction All the disputes are subject to SANGAMNER jurisdiction.
Delivery Within 3-5 Weeks after confirmed order
Installation NA
Packing @ 3% of Invoice amount
Freight Extra at actual
Warranty One year against any manufacturing defects only.



Public Financial Management System-PFMS

D/o Controller General of Accounts, Ministry of Finance

(formerly CPMS)

Welcome: **harishkumar**
 User Type: **PD**
 Financial Year: **2022-2023**



Login History
 English ▾
 Help

- AdhocReports
- SchemeWiseContactDetails
- Home
- CAM Reports
- User Manuals
- Masters
- Users
- Agency
- Sanctions
- PreSanction
- Sanction Custom Fields
- Printing Templates
- Sanction Templates
- Employee Info. System
- Reports
- Masters
- My Schemes
- Agencies
- My Funds
- Scheme Allocation
- Register/ Track Issue
- Utilisation Certificate
- OLD UC

Sanction Details

Controller:	037-SCIENCE AND TECHNOLOGY	Sanction Status:	Approved
Sanction Number:	SR/FST/COLLEGE-/2022/1308 (C)	Sanction Date:	06/03/2023
Sanction Type:	Transfer (DDO Bill)	Sanction Amount:	4050000
IFD Number:	IFD/C/I/010323/35/03656	IFD Date:	01/03/2023
Scheme:	1817-Science and Technology Institutional and Human Capacity Building	PAO:	058296-PAO(DST), New Delhi
DDO:	258297-DEPARTMENT OF SCIENCE & TECHNOLOGY (INCLUDING,NCST)	Remarks:	1st Release

North East Expenditure

Account Details:

Grant	Department (For UT Grants Only)	Function Head	Object Head	Category	Amount	External PAO	Available Budget
089 - Department of Science and Technology		3425602006804 - OTHER PROGRAMMES	35 - GRANTS FOR CREATION OF CAPITAL ASSETS	5 - VOTED	4050000		885970018

Agency	Scheme / Sub-Category	Amount	Sanctioned Type
TECHNOLOGY DEVELOPMENT BOARD, DEPARTMENT OF SCIENCE AND TECHNOLOGY	60414917022 - SCIENCE AND TECH II ▾	4,050,000.00	RTGS

Payment Details

Accredited Bank : *	UNION BANK OF INDIA ▾	Amount :	4050000	Not Payable Before : *	Required
----------------------------	-----------------------	-----------------	---------	-------------------------------	----------

Party Name	IFSC Code	Party Account No	Amount	Payee Remarks
SCIENCE AND TE	MAHB0000593	60414917022	4050000	PAO PAYMENT

Note: If the IFSC Code is not automatically shown it means bank A/C is not validated. If payment process is urgent please key in the IFSC Code and process payment. Please ensure IFSC Code is correct.

Back



GOVERNMENT OF INDIA
Ministry of Science & Technology
Department of Science & Technology
SR/FST/COLLEGE-/2022/1308 (C)
(R & D Infrastructure)

Technology Bhawan, New Delhi

Dated: 06/03/2023

Sanction Order

Subject: Financial assistance for the project entitled "FIST PG College Level A - Project" submitted by Physics, SHRI SHIVAJI MAHAVIDYALAYA, BARSHI, SOLAPUR, BARSHI, SOLAPUR, MAHARASHTRA, 413411. Release of the First installment regarding

Sanction of the President is hereby accorded to the approval to the above mention project at a total cost of Rs. 61,00,000/- (Rupees Sixty One Lakh only) for the duration of 5 Years . The detailed breakup of the grant for general as well as capital components are given below: -

Total General Component	₹ 7,00,000/-	DST Contribution (General)	₹ 5,25,000/-	HI/Industry/State Contribution (General)	₹ 1,75,000/-
Total Capital Component	₹ 54,00,000/-	DST Contribution (Capital)	₹ 40,50,000/-	HI/Industry/State Contribution (Capital)	₹ 13,50,000/-

Items	Budget Summary (in Rs.)					Total
	Year-1	Year-2	Year-3	Year-4	Year-5	
1- Non-Recurring						
HPLC (Living LC) with PDA Detector.-. - 1	1875000	0	0	0	0	1875000
Double Beam UV Visible Spectrophotometer.-. - 1	375000	0	0	0	0	375000
FTIR Spectrometer.-. - 1	1125000	0	0	0	0	1125000
BET Surface area analyser.-. - 1	675000	0	0	0	0	675000
(Non-Recurring Contribution)-.	1350000	0	0	0	0	1350000
Subtotal (Capital)	5400000	0	0	0	0	5400000
2- Recurring						
(Recurring Contribution)-.	0	81250	31250	31250	31250	175000
Industrial R&D Support (IRD)-.	0	75000	0	0	0	75000
Scientific Social Responsibility Activities (SSR)-.	0	75000	0	0	0	75000
Maintenance (M)-.	0	93750	93750	93750	93750	375000
Subtotal (General)	0	325000	125000	125000	125000	700000
Total Contribution (Cap.+ Gen.)	1350000	81250	31250	31250	31250	1525000
Total Project Cost (Cap.+ Gen.)	5400000	325000	125000	125000	125000	6100000

2. The sanction of the President is also accorded to the release of Rs. 40,50,000/- (Rupees Forty Lakh Fifty Thousand only) to the "Director/Registrar/Principal/Controller/Comptroller, SHRI SHIVAJI MAHAVIDYALAYA, BARSHI, SOLAPUR" being the First installment of grant as mentioned above table under "Capital Component" for the above mentioned project.

3. The expenditure involved is debitable to Demand No. 89 , Department of Science & Technology for the year 2022-23:

3425	Other Scientific Research(Major Head)
3425.60	Others : (Sub-Major Head)
3425.60.200	Assistance to Other Scientific Bodies(Minor Head)
3425.60.200.68	Science and Technology Institutional and Human Capacity Building(Sub Head)
3425.60.200.68.04	Other Programmes
3425.60.200.68.04.35	Grants for creation of capital assets
	(Previous: 3425.60.200.25.01.35)

4. The amount of Rs. 40,50,000/- (Rupees Forty Lakh Fifty Thousand only) will be drawn by DDO, DST and disbursed to the "CNA account of Autonomous body TDB in respect of Science and Technology Institutional and Human Capacity Building Scheme".

Name of A/C Holder	Science and technology Institutional and Human Capacity Building TDB
Bank A/C No	60414917022
Name of the Bank & branch	Bank of Maharashtra, Press Enclave - New Delhi
RTGS/IFSC code	MAHB0000593

5. The amount of Rs. 40,50,000/- (Rupees Forty Lakh Fifty Thousand only) will be drawn by the "CNA account of Autonomous body TDB and will be disbursed to the Director/Registrar/Principal/Controller/Comptroller, SHRI SHIVAJI MAHAVIDYALAYA, BARSHI, SOLAPUR".

The bank details for electronic transfer of funds through RTGS are given below: -

Name of A/C Holder	Shri Shivaji Mahavidyalaya Barshi STIHCB 1817 Scheme
Bank A/C No	60434237611
Name of the Bank & branch	Bank of Maharashtra
RTGS/IFSC code	MAHB0001174

6. As per Rule 234 of GFR 2017, the sanction has been entered at S. No 102 . in the register of grants maintained in the R & D Infrastructure for the scheme FIST PG College Level A.


7. This issues with the concurrence of IFD Vide their Concurring Dy. No IFD/C/L/010323/35/03656 dated 01/03/2023.

8. The GI will keep all the funds received in the Central Nodal Account only and shall not transfer the funds to any other account or not divert the same to Fixed Deposits/ Flexi-Account/ Multi-Option Deposit Account/ Corporate Liquid Term Deposit (CLTD) account etc. The funds released to GI shall not be parked in bank account of any other agency.

9. The GI will ensure the compliance of OM. No. F. No. 1/(18)/PFMS/FCD/2021 dated March 9, 2022 of Department of Expenditure, Ministry of Finance.

10. This sanction order is subject to the Terms & Conditions as annexured .


11. The organization is registered on NGO Darpan Portal and their Unique ID is MH/2018/0221491


Dr. G HARISH KUMAR
Scientist - 'F'
harishkumar@nic.in

To,
The Pay & Accounts Officer,
Department of Science & Technology,
New Delhi - 110 016.

Copy of information and necessary action to: -

1. The Principal Director of Audit, Scientific Department, IIIrd floor, AGCR Building, I.P. Estate, New Delhi.
2. The Financial Advisor, Integrated Finance Division, Technology Bhavan, New Mehrauli Road, Block C, Qutab Institutional Area, New Delhi, Delhi 110016
3. The Internal Audit Wing, Department of Science & Technology, Technology Bhavan, New Mehrauli Road, Block C, Qutab Institutional Area, New Delhi, Delhi 110016
4. Drawing and Disbursing Officer, DST, Cash Section. (two copies)
5. Principal, Physics, SHRI SHIVAJI MAHAVIDYALAYA, BARSHI, SOLAPUR, Barshi, Solapur, Maharashtra - 413411
6. The Director/Registrar/Principal/Controller/Comptroller/Chief Executive Officer(CEO), SHRI SHIVAJI MAHAVIDYALAYA, BARSHI, SOLAPUR, Barshi, Solapur, Maharashtra - 413411
7. Secretary, TDB, New Delhi (for allocation of limits to implementing agency)
8. Head (R & D Infrastructure) DST
9. Sanction Folder (R & D Infrastructure)


Dr. G HARISH KUMAR
Scientist - 'F'
harishkumar@nic.in



GOVERNMENT OF INDIA
Ministry of Science & Technology
Department of Science & Technology
SR/FST/COLLEGE-/2022/1308 (C)

Terms & Conditions

1. The grantee organization will furnish to the Department of Science & Technology, financial year wise Utilization Certificate (UC) in the proforma prescribed as per GFR 2017 and audited statement of expenditure (SE) along with up to date progress report (Vis-a-Vis Target Vs-Achievement) at the end of each financial year duly reflecting the interest earned / accrued on the grant received under the project. This is also subject to the condition of submission of the final statement of expenditure, utilization certificate and project completion report within one year from the scheduled date of completion of the project.

2. Subsequent releases of grants to the grantee institute would be made on the basis of the targeted deliverables with the timelines i.e. "Targets Vs Achievement" as mentioned in the Table below:

S. No.	Target with Proposed First Instalment
	Procurement/ Installation of following R&D Infrastructure
1.	HPLC (Living LC) with PDA Detector Software
2.	Double Beam UV Visible Spectrophotometer
3.	FTIR Spectrometer.
4.	BET Surface area analyser

3. The Department/Institute will appropriately limit the expenditure within the sanctioned amount in case of any anticipated excess expenditure. **The Department is requested to utilize the released funds in the first one year from the date of sanction order.**

4. The grantee organization will have to enter & upload the Utilization Certificate in the PFMS portal besides sending it in physical form to this Division. The subsequent/final installment will be released only after confirmation of the acceptance of the UC by the Division and entry of previous Utilization Certificate in the PFMS.

5. If the grant has been released under capital head through separate sanction order under the same project for purchase of equipment(s), separate SE/UC has to be furnished for the released Capital head grant.

6. The grant-in-aid being released is subject to the condition that:-

a) A transparent procurement procedure in line with Provisions of General Financial Rules 2017 will be followed by the Institute/Organization under the appropriate rules of grantee organization while procuring capital assets sanctioned for the above mentioned project and a certificate to this effect will be submitted by the Grantee organization immediately on receipt of the grant.

b) While submitting Utilization Certificate/Statement of Expenditure, the organization has to ensure submission of supporting documentary evidences with regard of the purchase of equipment/capital assets as per the provisions of GFR 2017. Subsequent release of grants under the project shall be considered only on receipt of the said documents.

7. As per the GFR 2017 Rule 230 (8) the Grantee Institute should ensure that all the interests or other earnings against Grant-in-Aid or advances (other than reimbursement) released to any Grantee institution should be mandatorily remitted to the Consolidated Fund of India immediately after finalization of the accounts. Such advances will not be allowed to be adjusted against future releases.

8. As per the GFR 2017 Rule 230 (17) "the Grantee Institute should agree to make reservations for Scheduled Castes and Scheduled Tribes or OBC in the posts or services under its control on the lines indicated by the Government of India"

9. DST reserves sole rights on the assets created out of grants. Assets acquired wholly or substantially out of government grants (except those declared as obsolete and unserviceable or condemned in accordance with the procedure laid down in GFR 2017), shall not be disposed of without obtaining the prior approval of DST.
10. The account of the grantee organization shall be open to inspection by the sanctioning authority and audit (both by C&AG of India and Internal Audit by the Principal Accounts Office of the DST), whenever the organization is called upon to do so, as laid down under Rule 236(1) of General Financial Rules 2017.
11. Due acknowledgement of technical support / financial assistance resulting from this project grant should mandatorily be highlighted by the grantee organization in bold letters in all publication / media release as well as in the opening paragraphs of their Annual Reports during and after the completion of the project.
12. Failure to comply with the terms and conditions of the Bond will entail full refund with interest in terms of Rule 231 (2) of GFR 2017.
13. It is mandatory to use EAT module in PFMS, failing which no further funds shall be released.
14. Goods (Consumable/Equipment) available in GeM portal are to be procured mandatorily online through GeM only as per the provisions of Rule 149 of GFR.
15. The Grantee Institute should follow Global Tendering Enquiry (GTE) conditions as per Department of Expenditure ID Note No:4/1/2021-PPD dated 10.09.2021.
16. If One time assistance or non-recurring grant as Grant-in-Aid for Rs. 10.00 lakhs, to Rs. 50.00 lakhs, it should be included in the Annual Report of the Institute.
17. The Grantee Institute must ensure any other provisions of GFR-2017 and guidelines/amendments issued from Govt. of India from time to time.
18. To maintain transparency and accountability, the facilities acquired from FIST Grant should be mapped to Indian Science Technology and Engineering facilities Map i.e. I-STEM portal (www.istem.gov.in) and should be accessible to the scientific community and industry. DST should be informed after mapping the research facilities in the I-STEM Portal.
19. The Grantee Institution should promote services of FIST facilities to the demands of outside faculties, researchers, scientists and students at other academic institutes, universities, nearby colleges national laboratories, R&D Labs, Startups, and Industries to enable them to carry out R&D activities to promote FIST collaborative research endeavours.
20. Special seminar/s on usage and upkeep of scientific instruments might be conducted from time to time by the beneficiary organization to ensure smooth functioning as well as maximum uptime of the established facility.
21. A task-force with representation from IFD, any Division of DST along with any scientist of the R&D Infrastructure Division would undertake random check on the status of utilization of the major facilities supported by DST, as and when needed.
22. To give visibility to the identified department, the department may be called as "DST-FIST Sponsored Department". The Public Notice displaying the Logo of the FIST Program may be downloaded from the DST website and suitably displayed in this regard.
23. The Grantee Institution should follow, implement and adopt the Scientific research infrastructure sharing maintenance and networks (**SRIMAN**) guidelines of Ministry of Science & Technology, GoI, released on May 2022.
24. The Grantee Institution should follow and adopt the Scientific social responsibility (**SSR**) guidelines of Ministry of Science & Technology, GoI, released on May 2022. While utilising the grant which has released towards industrial R&D support and SSR component, the Grantee Institute must ensure the implementation of SSR broad guidelines both in letter and spirit and should highlight the benefits of SSR guidelines among stakeholders of FIST.



भारत सरकार

विज्ञान और प्रौद्योगिकी मंत्रालय

विज्ञान और प्रौद्योगिकी विभाग

SR/FST/COLLEGE-/2022/1308 (C)

निबंधन और शर्तें

1. अनुदानग्राही संस्थान प्रत्येक वित्त वर्ष के अंत में इस परियोजना के अंतर्गत प्राप्त अनुदान पर अर्जित/प्रोद्भूत ब्याज को विधिवत रूप से दर्शाते हुए अद्यतन प्रगति रिपोर्ट (लक्ष्य बनाम उपलब्धि) के साथ जीएफआर 2017 में विनिर्दिष्ट प्ररूप में वित्तीय वर्ष-वार उपयोग प्रमाण पत्र (यूसी) और व्यय का लेखापरीक्षित विवरण (एसई) विज्ञान और प्रौद्योगिकी विभाग को प्रस्तुत करेगा। यह परियोजना की समाप्ति की निर्धारित तारीख से एक वर्ष भीतर व्यय का अंतिम विवरण, उपयोग प्रमाण-पत्र और परियोजना समाप्ति रिपोर्ट प्रस्तुत करने की शर्त के भी अध्यधीन है।
2. अनुदानग्राही संस्थान को बाद में जारी किए जाने वाले अनुदानों को समय-सीमा के साथ लक्षित सुपुर्दगी के आधार पर किया जाएगा अर्थात् "लक्ष्य बनाम उपलब्धि" जैसा कि नीचे दी गई तालिका में उल्लेख किया गया है:

क्रमांक	प्रस्तावित प्रथम किश्त के साथ लक्ष्य
	निम्नलिखित अनुसंधान एवं विकास अवसंरचना की खरीद/स्थापना
1.	HPLC (Living LC) with PDA Detector Software
2.	Double Beam UV Visible Spectrophotometer
3.	FTIR Spectrometer.
4.	BET Surface area analyser

3. विभाग/संस्थान किसी भी प्रत्याशित अधिक व्यय के मामले में व्यय को स्वीकृत राशि के भीतर उचित रूप से सीमित करेगा। विभाग से अनुरोध है कि जारी की गई धनराशि का उपयोग स्वीकृति आदेश की तिथि से प्रथम एक वर्ष में करें।
4. अनुदानग्राही संस्थान को उपयोग प्रमाण-पत्र इस प्रभाग में भौतिक रूप में भेजने के साथ-साथ पीएफएमएस पोर्टल पर प्रविष्ट और अपलोड करना होगा। अनुवर्ती/अंतिम किश्त प्रभाग द्वारा यूसी की स्वीकृति की पुष्टि और पीएफएमएस में पूर्ववर्ती उपयोग प्रमाण-पत्र की प्रविष्टि के बाद ही जारी की जाएगी।
5. यदि अनुदान एक ही परियोजना के अंतर्गत उपस्कर (रॉ) की खरीद के लिए पृथक संस्वीकृति आदेश के माध्यम से पूंजी-शीर्ष के अंतर्गत जारी किया गया है तो जारी किया गया पूंजी-शीर्ष अनुदान के लिए पृथक एसई/यूसी प्रस्तुत करना होगा।
6. जारी किया जा रहा सहायता अनुदान निम्नलिखित शर्तों के अध्यधीन है-
 - क) उपर्युक्त परियोजना के लिए संस्वीकृत पूंजी आस्तियों की खरीद करते समय अनुदानग्राही संस्थान के उचित नियमों के तहत संस्थान/संगठन द्वारा सामान्य वित्तीय नियमावली 2017 के उपबंधों के अनुरूप पारदर्शी खरीद प्रक्रिया का अनुपालन किया जाए और अनुदान प्राप्ति पर तुरंत प्रभाव से अनुदानग्राही संगठन द्वारा इस आशय का प्रमाण-पत्र प्रस्तुत किया जाए।
 - ख) उपयोग प्रमाण-पत्र/ व्यय विवरण प्रस्तुत करते समय, संगठन को जीएफआर 2017 के उपबंधों के अनुसरण में उपस्कर/पूंजी आस्तियों की खरीद के संबंध में संबन्धित दस्तावेज़-साक्ष्य प्रस्तुत करना सुनिश्चित करना होता है।
7. जीएफआर नियमावली 2017 के नियम 230 (8) के अनुसार अनुदानग्राही संस्थान को सुनिश्चित करना चाहिए कि किसी भी अनुदानग्राही संस्थान को जारी किए गए सहायता अनुदान या अग्रिम (प्रतिपूर्ति से भिन्न) पर प्राप्त समस्त प्रकार के ब्याज या अन्य आय को लेखों को अंतिम रूप दिए जाने के तुरंत बाद भारतीय समेकित निधि में अनिवार्य रूप से विप्रेषित किया जाए। ऐसे अग्रिमों को भविष्य में जारी की जाने वाली निधियों में समायोजित करने की अनुमति नहीं दी जाएगी।
8. जीएफआर नियमावली 2017 के नियम 230 (17) के अनुसार, "अनुदानग्राही संस्थान को भारत सरकार के निर्देशानुसार अपने

9. डीएसटी, अनुदान से सृजित परिसंपत्तियों पर एकमात्र सुरक्षित अधिकार रखता है। सरकारी अनुदानों से पूरी तरह से या पर्याप्त रूप से अर्जित संपत्ति (जीएफआर 2017 में निर्धारित प्रक्रिया के अनुसार अप्रचलित और अनुप्रयोज्य, अनुपयोगी घोषित अनुदानों से इतर), का निपटारा डीएसटी का पूर्व अनुमोदन प्राप्त किए बिना नहीं किया जाएगा।
10. जैसा कि सामान्य वित्तीय नियमावली 2017 के नियम 236 (1) के तहत निर्धारित किया गया है, अनुदानग्राही संगठन का लेखा स्वीकृति प्रदाता प्राधिकारी और लेखा परीक्षक (भारत के नियंत्रक एवं महालेखापरीक्षक और डीएसटी के प्रधान लेखा कार्यालय दोनों द्वारा आंतरिक लेखा परीक्षा) द्वारा निरीक्षण किए जाने, जब भी संगठन को ऐसा करने के लिए कहा जाता है, हेतु अभिगम्य होगा।
11. इस परियोजना अनुदान से प्राप्त तकनीकी सहायता/वित्तीय सहायता की उचित पावती को अनुदानग्राही संगठन द्वारा सभी प्रकाशनों/मिडिया प्रकाशनी में मोटे अक्षरों में और परियोजना के पूरा होने के दौरान और तदुपरांत उनकी वार्षिक रिपोर्टों के शुरुआती पैराग्राफों में अनिवार्य रूप से दिखाया किया जाना चाहिए।
12. बॉन्ड के नियमों और शर्तों का पालन करने में असफल होने पर जीएफआर 2017 के नियम 231 (2) के अनुसार पूरी राशि सब्याज वापस करनी होगी।
13. पीएफएमएस में ईएटी मॉड्यूल का उपयोग करना अनिवार्य है, ऐसा न करने पर अन्य कोई भी आगामी निधि जारी नहीं की जाएगी।
14. जीएफआर के नियम 149 के उपबंधों के अनुसार जीईएम पोर्टल पर उपलब्ध वस्तुओं (उपभोज्य वस्तु /उपस्कर) का अनिवार्यतया आनं लाइन प्रापण जैम (जीईएम) ही के माध्यम से किया जाना है।
15. अनुदान ग्राही संस्थान को व्यय विभाग के आईडी नोट संख्या: 4/1/2021-पीपीडी दिनांक 10.09.2021 के अनुसार वैश्विक निविदाकरण जांच-पड़ताल (जीटीई) नियमों का पालन करना चाहिए।
16. यदि एकबारगी सहायता या गैर-आवर्ती अनुदान 10.00 लाख रुपये से 50.00 लाख रुपये के सहायता अनुदान का हो तो इसे संस्थान की वार्षिक रिपोर्ट में दर्ज किया जाना चाहिए।
17. अनुदान ग्राही संस्थान को जीएफआर-2017 के किसी भी अन्य उपबंध और समय-समय पर भारत सरकार द्वारा जारी दिशा-निर्देश/संशोधन का अनुपालन सुनिश्चित करना चाहिए।
18. पारदर्शिता और जवाबदेही बनाए रखने के लिए, एफआईएसटी अनुदान से प्राप्त सुविधाओं को भारतीय विज्ञान प्रौद्योगिकी और इंजीनियरिंग सुविधाओं के मानचित्र यानी आई-एसटीईएम पोर्टल (www.istem.gov.in) पर मैप किया जाना चाहिए और वैज्ञानिक समुदाय और उद्योग के लिए सुलभ होना चाहिए। आई-एसटीईएम पोर्टल में अनुसंधान सुविधाओं का मानचित्रण करने के बाद डीएसटी को सूचित किया जाना चाहिए।
19. अनुदानग्राही संस्थान को अन्य शैक्षणिक संस्थानों, विश्वविद्यालयों, नजदीकी कॉलेजों, राष्ट्रीय प्रयोगशालाओं, अनुसंधान एवं विकास प्रयोगशालाओं, स्टार्टअप्स और उद्योगों के बाहरी संकायों, शोधकर्ताओं, वैज्ञानिकों और छात्रों की मांगों के लिए एफआईएसटी सुविधाओं की सेवाओं को बढ़ावा देना चाहिए ताकि वे अनुसंधान एवं विकास गतिविधियों को बढ़ावा देने के लिए सक्षम हो सकें FIST सहयोगी अनुसंधान प्रयास।
20. लाभार्थी संगठन द्वारा समय-समय पर वैज्ञानिक उपकरणों के उपयोग और रखरखाव पर विशेष संगोष्ठी आयोजित की जाय ताकि सुचारु संचालन के साथ-साथ स्थापित सुविधा के अधिकतम अपटाइम को सुनिश्चित किया जा सके।
21. आईएफडी, डीएसटी के किसी भी डिवीजन के प्रतिनिधित्व के साथ एक टास्क फोर्स, आर एंड डी इंफ्रास्ट्रक्चर डिवीजन के किसी भी वैज्ञानिक के साथ, जब भी जरूरत हो, डीएसटी द्वारा समर्थित प्रमुख सुविधाओं के उपयोग की स्थिति पर यादृच्छिक जांच करेगा।
22. पहचाने गए विभाग को दृश्यता देने के लिए, विभाग को "DST-FIST प्रायोजित विभाग" कहा जा सकता है। एफआईएसटी कार्यक्रम के लोगो को प्रदर्शित करने वाली सार्वजनिक सूचना को डीएसटी वेबसाइट से डाउनलोड किया जा सकता है और इस संबंध में उपयुक्त रूप से प्रदर्शित किया जा सकता है।
23. अनुदानग्राही संस्थान को मई 2022 को जारी विज्ञान और प्रौद्योगिकी मंत्रालय, भारत सरकार के वैज्ञानिक अनुसंधान अवसंरचना साझा रखरखाव और नेटवर्क (श्रीमान) दिशानिर्देशों का पालन, कार्यान्वयन और अपनाना चाहिए।
24. अनुदानग्राही संस्थान को मई 2022 को जारी विज्ञान और प्रौद्योगिकी मंत्रालय भारत सरकार के वैज्ञानिक सामाजिक उत्तरदायित्व (एसएसआर) दिशानिर्देशों का पालन करना चाहिए और उन्हें अपनाना चाहिए। औद्योगिक अनुसंधान एवं विकास सहायता और एसएसआर घटक के लिए जारी किए गए अनुदान का उपयोग करते हुए अनुदानग्राही संस्थान को एसएसआर के व्यापक दिशानिर्देशों का अक्षरशः कार्यान्वयन सुनिश्चित करना चाहिए और एफआईएसटी के हितधारकों के बीच एसएसआर दिशानिर्देशों के लाभों को रूजगार करना चाहिए।

HRD-11012/1/2022-HRD-DBT

Government of India
Ministry of Science & Technology
Department of Biotechnology

Block No. 2, 6-8th Floor
CGO Complex, Lodi Road
New Delhi-110003
Dated: 02/01/2023

ORDER

In continuation of this Department's sanction order of even no. dated 23.03.2022 sanction of the President is hereby accorded under Rule 18, of the delegation of Financial Power Rules, 1978 to the release of an amount of **Rs 33.00 lakhs (Rupees Thirty-Three Lakhs only)** to **Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur - 413411 (Maharashtra) as first year release** under recurring head for the implementation of the project for the **Star Status Award** of the Star College Scheme for the financial year 2022-23 as per details given below:-

(Rs. In lakhs)

Institute/College Name	GIA-General	Total Amount
Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur - 413411 (Maharashtra)	Recurring*	33.00
	33.00	
* Travel limited to -Rs 2.00 Lakhs, Contingency limited to -Rs 1.00 Lakhs. Other Recurring @ Rs 5.00. lakhs per dept. for 6 Depts. (1. Physics, 2. Chemistry, 3. Botany, 4. Zoology, 5. Microbiology and 6. Electronics)		

2. The amount of **Rs 33.00 lakhs (Rupees Thirty-Three Lakhs only)** shall be drawn by Pay & Account Officer, DBT and disbursed to the CNA Account of NII in respect of Biotechnology Research and Development Scheme as per the details are given below: -

Account Name	Saving Account No.	IFSC Code	Bank Branch Address
National Institute of Immunology	017101023637	ICIC0000171	ICICI Bank, E-30, Saket, New Delhi-110017

3. CNA, NII shall assign/allocate drawing limit of **Rs 33.00 lakhs (Rupees Thirty-Three Lakhs only)** into the **Zero Balance Subsidiary Account** of **Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur - 413411 (Maharashtra)** as per details given below and at Annexure-1:

Name of the Account	Project Registration Number	Account Number	IFSC Code
Shri Shivaji Mahavidyalaya, Barshi	HRD-11012/1/2022-HRD-DBT	109901002987	ICIC0001099

4. The interest so earned should be reported to DBT in the utilization certificate and statement of expenditure. The interest so earned should be refunded to the consolidated funds of India through Bharat Kosh (NTRP) Portal.


डॉ. गरीमा गुप्ता / Dr. GARIMA GUPTA
वैज्ञानिक 'एफ' / Scientist 'F'
बायोटेक्नोलॉजी विभाग / Dept. of Biotechnology
विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

Continue...2/-

5. As per "Rule 236 (1) of GFR 2017", the Account of all Grantee Institution or Organizations shall be open to inspection by the sanctioning authority and audit, both by the Comptroller and Auditor General of India under the provision of CAG(DPC) Act 1971 and internal audit by the Principal Accounts Office of the Ministry or Department, whenever the institute or Organization is called upon to do so.
6. **The Principal, Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur - 413411 (Maharashtra)** will submit the Statement of Expenditure (SE) and audited Utilization Certificate (UC) of expenditure in respect of above mentioned amount.
7. Continuation of the project beyond 31.03.2023 will be subject to the appraisal and approval of the relevant scheme for the continuation beyond 31.03.2023.
8. Being the first release to the Programme no Utilization Certificate pertaining to this programme is required with the college.
9. No International Travel will be undertaking from the sanctioned project grant unless specified otherwise.
10. This sanction pertains to the FY-2021-22 and has been revalidated to the current FY-2022-23.
11. The expenditure involved is debitable to:

Demand No. 90	Department of Biotechnology
3425	Other Scientific Research (Major Head)
60	Others (Sub Major Head)
60.200	Assistance to Other Scientific Bodies (Minor Head)
29	Biotechnology Research and Development, Human Resource Development, Research Resources and facilities
29.17	Assistance for Research and Development
29.17.31	Grants-in-Aid General for the year 2022-23

12. The terms and conditions of the grant remain unchanged.
13. This issues under powers delegated to this Dept. and with the concurrence of IFD vide their **San No. 102/IFD/SAN/41/2022-23 dated: 21.04.2022**
14. This sanction order has been noted at serial **No. 53** in the register of grants.

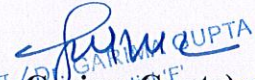

(Dr. Garima Gupta)
Scientist-F
डॉ. गरीमा गुप्ता / Dr. GARIMA GUPTA
वैज्ञानिक (सक) / Scientist (F)
बायोटेक्नोलॉजी विभाग / Department of Biotechnology
विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

To,

The Pay & Accounts Officer
Department of Biotechnology
New Delhi-110003

Copy to:

1. The Principal, Director of Audit (Scientific Departments), DACR Building, New Delhi-110002.
2. Cash Section, DBT, (2 Copies)
3. The Principal, Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur - 413411 (Maharashtra).
4. Dr. V. M. Gurame, Assistant Professor, Department of Chemistry, Shri Shivaji Mahavidyalaya, Barshi, Dist. Solapur - 413411 (Maharashtra).
5. CNA, NII, New Delhi
6. Sanction Folder


डॉ. गरीमा (Dr. Garima Gupta)
वैज्ञानिक (Scientist-F)
बायोटेक्नोलॉजी विभाग / Department of Biotechnology
विज्ञान और प्रौद्योगिकी मंत्रालय / Ministry of Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi