

## **Evaluative Report of the Department (science)**

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## Evaluation Report of School of Life Sciences

In the past century, biology, with inputs from other disciplines, has made tremendous progress in terms of advancement of knowledge, development of technology and its applications. As a consequence, in the past fifty years, there has been a paradigm shift in our interpreting the life process. In the process, modern biology had acquired a truly interdisciplinary character in which all streams of sciences have made monumental contributions. Because of such rapid emergence as a premier subject of teaching and research; a necessity to restructure classical teachings in biology was recognised by the academics worldwide. In tune with such trends, the academic leadership of Jawaharlal Nehru University conceptualised the School of Life Sciences as an interdisciplinary research/teaching programme unifying various facets of biology while reflecting essential commonality regarding structure, function and evolution of biomolecules. The School was established in 1973 and since offering integrated teaching and research at M. Sc/ Ph.D level in various sub-disciplines in life sciences. Since inception, it remained dedicated to its core objectives and evolved to be one of the top such institutions in India and perhaps in South East Asia. Such interdisciplinary nature of teaching and research attracts the best students from various corners of the country. Its faculty comprises notable teachers and researchers well recognised in their respective fields by peer groups in India and as well as abroad. The approaches undertaken by constituent research groups span from studying microbes to mammals using tools of physiology to bioinformatics. The specific research areas of interest include front line disciplines like genomics, molecular biology, molecular genetics, immunology, biology of infectious agents, neurophysiology, plant and microbial biotechnology, cellular and developmental biology, photobiology, cancer biology and structural biology. The School of Life Sciences is perhaps the only institution in the country that can rightly claim to cover the entire spectrum of teaching and research in biological sciences. Conscious efforts are continuously made to strengthen such a unique character of the School further.

The School has earned a reputation of running interdisciplinary programs of study at the Masters and Ph D level. The M. Sc program of the School is a unique endeavour in the country as the admission is open to graduates with backgrounds in either biology or physical sciences. Upon arrival, these students are brought to equal levels by offering remedial courses in physical sciences for students coming from bioscience streams and in elementary biology for students having a degree in physical science. Every year students are selected on the basis of entrance test conducted at more than 40 centers nationwide

with a success rate of ~1 %. The School has an in-house system of continuous review of its academic programs that allows inclusion of newer areas of research and teaching. The four Semester M.Sc. courses involve vigorous laboratory training. The M.Sc. laboratories are well equipped to give hands on exposure in the subjects taught to them in the theory classes. Besides, it is mandatory for all the students to carry out a research project in any laboratory of their choice for the 3<sup>rd</sup> and 4<sup>th</sup> semesters which motivates them to pursue Ph D level research. Our M. Sc. students are often sought after by research labs in India and abroad. They have performed exceptionally well in the universities, institutes and industries. The M.Phil/Ph.D program of the School is specially designed to enable the students to acquire basic knowledge in one of the frontline areas of modern biology and also to enable them in designing and implementing independent research projects. A unique feature of our M.Phil/Ph.D program is exposing the students to the theory and practice of a large number of modern concepts, tools, techniques and research methodology before a student embarks upon research on a specific topic for Ph.D dissertation. Most of our Ph.D students continue their career in research and development in reputed institutions and are well recognized for their work. With continuous recruitment in newer areas, we keep on embarking upon emerging areas of biotechnology, bioinformatics, molecular medicine, genomics, proteomics and metabolomics.

Recognising the potentials of the School as a Centre for Excellence, many funding agencies like the UGC, CSIR, DST, DBT, ICMR, ICAR, DAE and DRDO have extended financial support to innovative research proposals from various members of the faculty. Also, several International agencies like the Wellcome Trust, the Indo-Swedish, Indo-Swiss, Indo-French, Indo-German, Indo-EU and Indo-US agencies too have been attracted to fund research proposed by the faculty. The faculty often collaborates within the School as well as with faculty from other Schools of JNU and with scientists in various neighbouring institutes as well other institutes in India.

The School has consistently maintained a high level of productivity in terms of publications in reputed peer reviewed journals and books. Over 1, 500 papers have been authored by the faculty of the school since its inception. Over 440 students of the School have been awarded Ph.D. Degree. Members of the faculty have been honoured with recognitions like members of the Planning Commission, Padma awards, elected Fellows of various Academies, Bhatnagar Award, Birla Award, Third World Academy Award, Ranbaxy Award, J.C. Bose Award, Bhasin Award and many others.

Under the “University with Potential for Excellence (UGC)” from the UGC, the School initiated annual Summer School for six weeks for students of B.Sc., M.Sc., college/University teachers. This programme has been in operation for the past seven and has been hugely popular nationwide as evident from the number of applications and

feedback received every year. Under this programme, about 35 students are enrolled and are exposed to high-quality lectures by eminent scientists from JNU and from nearby institutions, along with hands-on laboratory training in various laboratories in the School.

The School also initiated an annual research festival named ‘Biosparks’ organised by the students during February-March. In this symposium, the research work of students is showcased by lectures and poster sessions. A small number of lectures by distinguished scientists are also arranged. Also, a competitive event is also organised for innovative project proposals. Merit awards are given for best posters and project proposals presented by the students.

Recently, UGC has selected the School as a nodal centre under its “Networking Research Centre” scheme. Under this scheme, summer and winter workshops are organized wherein students and teachers from all over the country are trained by the faculty of the School. Emphasis is given particularly to universities located in underprivileged regions of the country.

The School has a well administered central instruments facility (CIF) housing numerous small as well as highly sophisticated instruments such as cell imaging, microarray, real-time PCR, flow cytometry, proteomics, etc., catering the need of each and every faculty member. Putting all these modern equipment for the cutting edge research under a single roof, the School has set an example of running a common instrumentation facility accessible round the clock for its students and faculty as well as for outside researchers. In addition, the School also has an Animal House for experimental animals and a Glass House facility for experimental and transgenic plants.

The vision of the School is to make it a scientific hub of cutting-edge research in all areas of modern biology with which any student, faculty or institute will be proud to be associated with. Since early days, it has remained a premier institute generating suitably trained and competent biologists to take up leadership position countrywide. We remain committed to further develop the teaching and research programs attracting a constant stream of talented young students to various facets of modern biology.

**Evaluative Report of the Department  
Period with effect from 1<sup>st</sup> July 2012 to 31<sup>st</sup> July 2016**

1. Name of the Department : **SCHOOL OF LIFE SCIENCES**
2. Year of establishment : **1970**
3. Is the Department is part of a : **University**  
School/Faculty of the University?
4. Names of programmes offered : **M.Sc and M.Phil/PhD**
5. Interdisciplinary programmes and  
Departments involved :
  - a. **DBT-BUILDER :**  
**Together with Special Centre for Molecular Medicine and School of Biotechnology.**
  - b. **Centre for excellence in Parasitology:**  
**Together with School of Environmental Sciences, Special Centre for Molecular Medicine and School of Biotechnology**
  - c. **UGC Resource Network:**  
**Postgraduate trainees from other Universities and institutes across India**
6. **Courses in collaboration with other Universities, Industries, Foreign Institutions etc.** : **None**
7. **Details of programmes discontinued, if any, with reasons** : **None**
8. **Examination System** : **Semester**
9. **Participation of the Department in the Courses offered by other Departments** : **None**

10. Number of teaching posts sanctioned, filled and actual: as on 31<sup>st</sup> July 2016

Designation	Sanctioned	Filled	Actual (including CAS and MPS)
<b>Professor</b>	31	23	
<b>Associate Professor</b>	8	4	
<b>Assistant Professor</b>	8	4	
<b>UGC Research Scientist</b>	2	2	
<b>UGC Recharge Faculty</b>	1	1	

11. Faculty Profile with name, qualification, designation, area of specialisation, experience and research under guidance: -

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
<b>PROF. S.K. GOSWAMI</b>	Ph.D.	Professor	Biochemistry, Molecular Biology, Redox Biology	18.03.1998	03	5.5
<b>PROF. P.K. YADAVA</b>	Ph.D.	Professor	RNA Biology, Cancer Molecular Biology,	07.09.1990	01	01

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
			Virology			
<b>PROF. R. MADHUBALA</b>	Ph.D.	Professor	Molecular Parasitology, Medical Biotechnology, Cell and Molecular Biology	13.12.1990	00	03
<b>PROF. B.N. MALLICK</b>	Ph.D.	Professor	Neurobiology of Sleep-Walking-REM Sleep	19.06.1986	02	03
<b>PROF. P.C. RATH</b>	Ph.D.	Professor	Molecular Biology: (a) Genomic Biology of Repetitive DNA and Noncoding RNA (b) Cytokines, Transcription Factors, Cell Signaling and Disease (c) Mesenchymal	17.12.1990	01	05

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
			Stem Cells from Mammalian Bone Marrow and Regenerative Medicine			
PROF. K. NATARAJAN	Ph.D.	Professor	Cell and Molecular biology/Molecular genetics: Transcription, chromatin and gene regulation	31.05.2001	01	05
PROF. SHWETA SARAN	Ph.D.	Professor	Cell and Developmental Biology	05.07.2005	00	04
PROF. SUPRIYA CHAKRABORTY	Ph.D.	Professor	Begomoviruses : Molecular biology, host-virus interaction, RNAi and transgenic resistance	21.12.2010	01	04

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
PROF. AJAY KUMAR SAXENA	Ph.D.	Professor	Structural Biology of Disease related proteins, Structure guided Drug/Vaccine development	23.03.2011	00	03
PROF. DEEPAK SHARMA	Ph.D.	Professor	Neurobiology of Ageing and Epileptic brain and its responses to antioxidants	28.02.2000	0.5	00
PROF. RANA PRATAP SINGH	Ph.D.	Professor	Carcinogenesis, Cancer Chemoprevention and Therapeutics, Tumor Angiogenesis, Radiation Therapy, Anticancer Drug Development	16.11.2006	00	3.5

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
			from Natural Agents			
PROF. ASHIS KUMAR NANDI	Ph.D.	Professor	Genetic and Epigenetic Regulation of Plant Immune response	25.11.2004	01	05
PROF. ASHWANI PAREEK	Ph.D.	Professor	Functional genomics, Forward and reverse genetics, abiotic stress and crop biotechnology	18.08.2003	00	03
PROF. ALOK KUMAR MONDAL	Ph.D.	Professor	Yeast Molecular and Cell Biology	10.07.2013	00	00
PROF. ATUL KUMAR JOHRI	Ph.D.	Professor	Microbial pathogenesis, Membrane Proteins structure, Nanotechnology for rapid	29.06.2004	2.5	04

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
			detection of pathogens. Host-microbe interaction.			
PROF. SNEHA SUDHA KOMATH	Ph.D.	Professor	Glycobiology/ Biophysical Chemistry	19.06.2003	01	2.5
PROF. S. GOURINATH	Ph.D.	Professor	Structural and Functional studies of crucial pathway enzymes/ proteins from <i>E. histolytica</i> & <i>H. pylori</i> .	17.09.2003	01	06
DR. NEELIMA MONDAL	Ph.D.	Associate Professor	Transcription regulation of p53 and its family members, Functional characterization of gyrase from <i>Plasmodium</i>	06.10.2003	02	01

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.P hil	Ph.D.
			<i>falciparum.</i>			
DR. SUSHIL KUMAR JHA	Ph.D.	Associate Professor	Neuroscience	11.01.2007	03	02
DR. ROHINI MUTHUSWAMI	Ph.D.	Associate	Epigenetics and Chromatin remodelling	24.02.2004	01	3.5
DR. AMAL CHANDRA MONDAL	Ph.D.	Associate Professor	Neurobiology of depression and neurodegenerative disorders	01.10.2015	00	00
DR. SNEH LATA PANWAR	Ph.D.	Assistant Professor	Yeast Molecular Biology in <i>S. cerevisiae</i> and the pathogenic fungus <i>Candida albicans</i>	28.08.2006	02	01
DR. ASHU BHAN TIKU	Ph.D.	Assistant Professor	Radiation and Cancer Therapeutics	06.06.2007	01	02

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
DR. NITI PURI	Ph.D.	Assistant Professor	Molecular mechanisms of regulated exocytosis and protein traffic in immune cells. Role of mast cells in erythrophagocytosis, inter-action of nano-particles with immune effector cells	27.05.2008	01	04
DR. NIRALA RAMCHIARY	Ph.D.	Assistant Professor	Comparative, Functional and Evolutionary Genomics of <i>Capsicum</i> species	01.10.2012	00	00
DR. KARUNAKAR KAR	Ph.D.	Assistant Professor	Biophysics	30.11.2016	00	00

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
DR. JAISHREE PAUL	Ph.D.	UGC Research Scientists	Microbiology	01.06.1988	00	04
DR. SOUMYA PRASAD	Ph.D.	UGC-Faculty Recharge	Conservation biology and functional ecology.		00	00
PROF. ALOK BHATTACHARYA	Ph.D.	<b>On extension</b> – Retired on 28.02.2016	Parasitology, Basic biology, Computation biology & Bioinformatics	26.05.1986	00	04
PROF. SUDHA MAHAJAN COWSIK	Ph.D.	<b>On extension</b> - Retired on 28.02.2015	Biophysics, Structural Biology	30.04.1985	01	00
PROF. R.K. KALE	Ph.D.	<b>On extension</b> - Retired on 31.05.2015	Radiation and Cancer Biology  Oxidative stress	20.05.1981	00	02

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
PROF. NEERA BHALLA SARIN	Ph.D.	<b>On extension</b> - Retired on 30.09.2015	Genetic manipulation of plants for stress alleviation, value addition and developmental studies	02.05.1986	01	04
PROF. R.N.K. BAMEZAI	Ph.D.	Retired on 31.12.2016	Genetics / Human Genetics	06.03.1989	00	06
PROF. B.C. TRIPATHY	Ph.D.	<b>On extension-</b> Retired on 31.01.2017	Photobiology	02.04.1987	02	02
DR. SURESH ABRAHAM	Ph.D.	Retired on 31.12.2016	Genetics	10.12.1984	01	01
PROF. RAJENDRA PRASAD	Ph.D.	Re-employed up to, 30.10.2015  Left on	Biochemistry	1985	00	4.5

Name	Qualification	Designation	Specialization	No. of Years of Experience (In JNU)	No. of Ph.D./ M.Phil. students guided for the last 4 years (01.06.2012 to 31.07.2016)	
					M.Phil	Ph.D.
		21.04.2015				

12. List of Senior Visiting Fellows, adjunct faculty, emeritus professors:

a) Senior Visiting Fellows (Under GIAN Program):

- i. **Professor Govindjee**, Professor Emeritus Biochemistry, Plant Biology; and Biophysics & Quantitative Biology, University of Illinois at Urbana-Champaign, Illinois, USA, URL: <http://www.life.illinois.edu/govindjee>, February 08, 2016 - March 04, 2016
- ii. **Prof. Bhanu P. Jena**, George E. Palade University Professor and Distinguished Professor of Physiology at the Wayne State University, USA, June 19 - 25, 2016
- iii. **Prof. Babu Tekwani**, National Center for Natural Products Research, School of Pharmacy, University of Mississippi, USA. July 25, 2016— August 05, 2016
- iv. **Prof. Christian Betzel**, Institute of Biochemistry and Molecular Biology, Martin-Luther-King Platz 6, Hamburg, Germany, November 14, 2016— November 25, 2016
- v. **Prof. Marilyn Parsons**, Center for Infectious Disease Research & Affiliate Professor of Global Health, University of Washington, Seattle, USA, February 21— March 03, 2017

b) Emeritus Faculty: Prof. P.N. Srivastava and Prof. Asis Datta

c) Adjunct Faculty: None

13. **Percentage of classes taken by temporary faculty - program-wise information**

Dr. Soumya Prasad (UGC Recharge):

LS 479	Biostatistics	2 credits	MSc
LS 577	<u>Fundamentals of Ecology</u>	2 credits	MSc
LS 654	<u>Advanced Biostatistics</u>	2 credits	MPhil

**14. Programme-wise Student Teacher Ratio:**

M.Sc : 1:7

M.Phil : 1:1.3

**15. Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual**

Sl. No.	Name of the post	Sanctioned	filled
01.	Administrative Officer	01	01
02	Section Officer	01	01
03.	Personal Assistant, Dean's Office	01	01
04.	Section Office personnel	10	10
05.	Technical Officers	03	03
06.	Technical personnel	20	20
07	Veterinary Officer, Animal House	01	01
08.	Personnel in Animal House	12	12
09.	Curator, Botanical Garden	01	01
10.	Personnel in Botanical Garden	04	04
11	Other supporting personnel		22

16. **Research thrust areas as recognized by major funding agencies:** Cell and Molecular Biology (UGC); Centre for Parasitology (DBT)
17. **Number of faculty with ongoing projects from a) national b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.**  
 Faculty at the School of Life Sciences receives funds from national and international agencies through competitive applications. During the previous five years following grants were received:
- a) 63 National projects of which 7 are interdisciplinary (DST, DBT, ICMR, CSIR, UGC).
  - b) 08 International Projects (European Commission, Indo-USA, Indo-German, Indo-Sri Lanka, Indo-Russian)  
 Each project received ~60-120 Lacs.
18. **Inter-institutional collaborative projects and associated grants received.**
- a) National collaboration- Collaborations are done by individual faculty members with reputed institutes like AIIMS, New Delhi; NII, New Delhi; IARI, New Delhi.
  - b) International collaboration- University of Washington, USA
19. **Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.:**

Sl. No.	Name of Funding Agency	Amount	Period	
			From	To
1	DST-FIST	6,32,00,000.00	2008-2014	
2	UGC-SAP (DRS-1)	77,00,000.00	2016-2021	
3	UGC-Networking	10,00,00,000.00	2008 - 2012	

**20. Research facility/centre with**

- state recognition
- national recognition
- international recognition

JNU does not have a policy of asking recognition by State/National/International bodies for its research facilities

**21. Special research laboratories sponsored by/created by industry or corporate bodies**

None

**22. Publications:**

- \* Number of papers published in peer-reviewed journals (national/international):

Year wise publication (1<sup>st</sup> April –31<sup>st</sup> March)

Year (1 <sup>st</sup> April –31 <sup>st</sup> March)	Number
2015-2016	77
2014-2015	55
2013-2014	57
2012-2013	40
2011-2012	54

- \* Monographs: none
- \* Chapters in Books: 13
- \* Edited Books: 0
- \* Books with ISBN with details of publishers: "Handbook of Disease causing Microbes" by Dr. Jaishree Paul, pub: Ane Books, Delhi and CRC Press, December 2015
- \* Number listed in International Database (For e.g. Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.)
- \* Citation Index:

The publications from the School are well cited. Details during the past five years is given below

Year	2016	2015	2014	2013	2012	2011
<b>Citation (cumulative)</b>	4482	4349	3787	3679	3489	2987

- \* SNIP
- \* SJR
- \* Impact Factor – range/average

The School has a track record of publishing in high impact Journals. The higher impact journals where faculty have published in the past five years are given below.

<b>Nature Genetics (IF: 35)</b>	Carcinogenesis (IF: 5.5)
<b>Neuron (IF: 14.7)</b>	Cancer Letters (IF: 4.7)
<b>Nat. Commun (IF: 10)</b>	Molecular Plant Pathology (IF: 3.9)
<b>PloS Pathogen (IF: 9)</b>	Journal of Clinical Microbiol (IF: 4.2)
<b>Prog Neurobiol (IF: 9)</b>	J. Bacteriology (IF: 4.7)
<b>Sleep Med Rev (IF: 8.7)</b>	J Biomol Struct Dynamics (IF: 5)
<b>Mutation Res Rev (IF: 8.2)</b>	J Proteome Research (IF: 5.1)
<b>Nucleic Acids Res (IF: 8)</b>	Photosynthesis Research (IF: 4.1)
<b>Nanotoxicology (IF: 7.8)</b>	PLoS ONE (IF: 4.1)
<b>Redox Biology (IF: 6.2)</b>	Biochem J (IF: 4.7)
<b>Plant Cell Environment (IF: 6.92)</b>	J. Chem Info Modeling (IF: 4.7)
<b>Free Radic Biol Med (IF: 5.9)</b>	Virus Research (IF: 3)
<b>RNA Biology (IF: 5.6)</b>	Acta Crystallogr (IF: 3)
<b>Nat. Scientific Reports (IF: 5.6)</b>	Virology Journal (IF: 3.2)
<b>J Biol Chem (IF: 5.3)</b>	Molecular Biology Reports (IF: 2.5)

- \* h-index: 67 (Current)

### 23. Details of patents and income generated :

**A. Prof. Rajendra Prasad**

Prasad R, Maurya I K, Chauhan V S, Thota C K, Sharma J. “Synthesis and Analysis of Antifungal Peptide mimics against transmembrane segments of multidrug ABC transporter Cdr1p of *Candida albicans*” Patent Applied: 2893/DEL/2012

**B. Prof. Rana Pratap Singh**

**Singh RP**, Nambiar D, Agarwal R. “A novel and selective radiosensitizing agent for providing mechanism-based radiosensitizing effects in prostate cancer”. Patent files, application no. 2889/del/2015.

**C. Prof. Ashwani Pareek**

- a. A Method for silencing the expression of a member of two –component system – OsPrr1 to increase salinity stress tolerance in rice” Indian Patent application no. 3016/DEL/2015.
- b. A novel rice mutant having multiple abiotic tolerance” Indian Patent application no. 4025/DEL/2015
- c. Hybrid-type Histidine Kinase Gene Isolated from Indica Rice IR64, and Clones Produced Thereby. Patent granted in USA (USPTO number US 9,234,189 B2)
- d. Hybrid-type Histidine Kinase Gene Isolated from Indica Rice IR64, and Clones Produced Thereby. Patent granted in Europe (EP number EP 09806540.2)
- e. Hybrid-type Histidine Kinase Gene Isolated from Indica Rice IR64, and Clones Produced Thereby. Patent granted in Philippines (1-2011-500293)
- f. Hybrid-type Histidine Kinase Gene Isolated from Indica Rice IR64, and Clones Produced Thereby. Patent granted in China (ZL 2009 8 0131254.4)

**24. Areas of consultancy and income generated: No information available.**

**25. Faculty selected nationally /internationally to visit other laboratories /institutions / industries in India and abroad:**

Faculty at the School of Life Sciences often visits various Universities/institutes both in India and abroad (details are given in **Annexure I**).

**26. Faculty serving in**

- a) National committees b) International committees c) Editorial Boards d) any other (please specify): **Annexure-I**

- b) Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs).  
Faculty attends Orientation and Refresher course as per UGC rules.

**27. Student projects**

- Percentage of students who have done in-house projects including inter-departmental projects: All M.Sc students do in-house projects of one year (3<sup>rd</sup> and 4<sup>th</sup> semester) along with their course work.
- Percentage of students doing projects in collaboration with other universities / industry/institute: None (as research work done in other institutes JNU does not fulfil the credit requirements)

**28. Awards/recognitions received at the national and international level by:**

- Faculty:

**Awards-2012-13**

- a. Sudha M.Cowsik: Kshanika oration award of Indian Council of Medical Research, Delhi.
- b. R.N.K. Bamezai: **Late L.D. Sanghvi Oration Award** for Outstanding Contribution in Human Genetics Research in India. Awarded by the Indian Society of Human Genetics at its 38th Annual Conference at BHU in the Year 2012., Received Padma Shri (2012) in Science and Technology from President of India.
- c. R.K. Kale: ET NOW National Education Leadership Award for the Outstanding Contribution to Education (2013). The 20<sup>th</sup> Dewang Mehta Business School Award for his Outstanding Contribution to Education (2012). ABP News National B-School Award for Outstanding Contribution to Education (2012). Maulana Azad Pursakar for Educational Upliftment-2012.
- d. R. Madhubala: J.C. Bose Fellow 2011 – 2015. Affiliate member Seattle Biomedical Research Institute, Seattle, USA. Chairperson (Life Sciences) panel for INSPIRE Faculty Award Pre-selection, Department of Science

and Technology, 2012. Senior Jury, INSPIRE AWARDS, Department of Science and Technology, 2012.

- e. Ashwani Pareek: CREST Fellowship, DBT, Government of India, to work at University of California, Davis, CA, USA (2012).

#### **Awards-2013-14**

- a. Ashwani Pareek: Award of Fellowship (F.N.A.Sc) by the National Academy of Sciences (NASI), Allahabad.

#### **Awards-2014-15**

- a. R.N.K. Bamezai: Outstanding Scientist Award by Select Bio, India, for the exemplary work in the area of Human Genetics and Genomics, in the 3<sup>rd</sup> Symposium on Genomics and Proteomics, organised by SelectBio, India on June 12th; 12-13th June 2014, Radisson Blue, Delhi
- b. Alok Bhattacharya: Aryabhata Medal of Indian National Science Academy, New Delhi
- c. B.C. Tripathy: Parija Samman, June, 2014., G V Joshi Memorial Award by Indian Society of Plant Physiologists, November 2014.
- d. Ajay Kumar Saxena: Bill & Melinda Gates Foundation travel award for GRC, 2012. NIH/NIAID, special performance award, 2005.
- e. S. Gourinath: National Bioscience Award for Career development 2013 (announced in June 2014), awarded by Department of Biotechnology, Ministry of Science and Technology, Govt. of India.
- f. Jaishree Paul: Registration waiver and Travel award was received to attend the conference in Bangkok

#### **Awards2015-16**

- a. R. Madhubala: President of India, Visitor Group Award 2016 in Research Category for Research in Molecular Parasitology. UGC-Israel Science Foundation Research award 2016-2018.
- b. S. Gourinath: Visitors Award (Presidents Award)-2015 awarded in March 2016, for Molecular Parasitology group at JNU.
- c. Sushil K Jha: Prof. Baldev Singh Oration Award (Association of

Physiologists and Pharmacologists of India, 2015)  
d. Jaishree Paul: Recipient of Visitor's Research award by the President of India on "Molecular Parasitology Research", 14<sup>th</sup> March 2016.

- Doctoral/post doctoral fellows – None
- Students: Secured First Rank in NET-National Eligibility Test in the year 2013 and 2014.
  - a. 2013 – Anand Yadav
  - b. 2014 – Abhishek Kanyal

**29. Seminars/ Conferences/Workshops organised and the source of funding (national/international) with details of outstanding participants, if any.**

- The Summer Research Programme-2012 was organized during summer vacation, from 24 May – 29 June 2012, as an education-outreach programme to motivate young students about science in general and basic as well as applied research in the area of Life Sciences and Biotechnology.
- Biosparks 2013, a unique event of the School organised, managed and convened entirely by students, was a symposium during "Biospark-2013" which was held at the School on 15 – 16 February, 2013, bringing together current researches in Life Sciences.
- A course/workshop was organized by Prof R. Madhubala on "A Global Infectious Diseases training program (GID-RTIP)" supported by Fogarty Centre (USA) and the Centre for Excellence (COE-DBT). The course/workshop was on "Drug design for Infectious Diseases". It was conducted by Dr. Wimhole (Seattle) and Dr. Paul Michaelis (Belgium), 14 – 18 January 2013.
- Beckman Coulter Flow Cytometry Workshop was organised by Dr. Niti Puri at the Advanced Instrumentation Research Facility, JNU on 30 – 31 October 2012.
- The Summer Research Programme-2013 was organized during summer vacation, from 27<sup>th</sup> May 2013 to 28<sup>th</sup> June 2013, as an education-outreach programme to motivate young students about science in general and basic as well as applied research in the area of Life Sciences and Biotechnology.
- Spandan-2013: M.Sc. students of SLS are organising annual festival SPANADAN. Several sports events are being organized from 05<sup>th</sup> -7<sup>th</sup> March 2013.

- Biosparks-2014, a unique event of the School organised, managed and convened entirely by students, was a symposium during “Biospark-2014” which was held at the School on March 21-22, 2014 bringing together current researches in Life Sciences.
- Prof. R. Madhubala and Prof. Alok Bhattacharya organised a workshop/conference on “Recent Trends in Molecular Parasitology” from March 27-29, 2014 supported by *DBT-Program Support in Molecular Parasitology*, Jawaharlal Nehru University, New Delhi.
- Prof S. Gourinath was the Treasurer and Local Organising member of “42<sup>nd</sup> National Seminar on Crystallography AND International Workshop on Application of X-ray diffraction for Drug Discovery” held during 21-23 November 2013 at JNU and at AIIMS, New Delhi
- The Summer Research Programme-2014 was organized during summer vacation, from 26<sup>th</sup> May 2014 to 4<sup>th</sup> July 2014, as an education-outreach programme to motivate young students about science in general and basic as well as applied research in the area of Life Sciences and Biotechnology.
- Biosparks-2015, a unique event of the School organised, managed and convened entirely by students, was a symposium during “Biospark-2015” which was held at the School on March 27-28, 2015 bringing together current researches in Life Sciences.
- Prof P.K. Yadava organised International Conference Stem Cell, JNU, Dec 2014 and International Conference. Cancer Biology, in Feb 2015
- Prof R. Madhubala and Prof. Alok Bhattacharya organised a workshop on “Molecular Parasitology” from March 20-21, 2015 under *DBT-Program Support in Molecular Parasitology*.
- Prof Neera Bhalla Sarin organised Science lecture series by JNU Alumni in 2014.
- Prof Rana Pratap Singh and Dr Niti Puri organised, International Symposium on Recent Advances in Radiobiology, Stem Cells and Cancer Research on February 19-21, 2015.
- Prof Rana Pratap Singh **co-organized**, 5th International Conference on Stem Cells and Cancer (ICSCC-2014): Proliferation, Differentiation and Apoptosis in November 8 -10, 2014).
- Dr Soumya Prasad was the member of the organising Committee “Uttarakhand Spring Bird Festival” 4 – 8<sup>th</sup> February 2015.
- The Summer Research Programme-2015 was organized during summer vacation, from 26<sup>th</sup> May 2015 to 4<sup>th</sup> July 2015, as an education-outreach programme to motivate young students about science in general and basic as well as applied research in the area of Life Sciences and Biotechnology.

- Biosparks-2016, a unique event of the School organised, managed and convened entirely by students, was a Symposium during “Biospark-2016” which was held in the School on March 18,19, 2016 bringing together current researches in Life Sciences.
- Prof Neera Bhalla Sarin organised 3<sup>rd</sup> International "Fascination of Plants Day" at School of Life Sciences, Jawaharlal Nehru University in 14<sup>th</sup> May 2015
- Prof Rana Pratap Singh organised International Symposium on *Role of Herbs in Cancer Prevention and Treatment* on 9-10 February 2016.
- Prof Rana Pratap Singh organised a Workshop on *Handling and Care of Laboratory Animals* on 11-14 February 2016.
- Prof Ashwani Pareek Organised, as Convener, “Jawaharlal Nehru University and University of Massachusetts, Amherst, USA (JNU-UMA) Joint Faculty Retreat in the area of Climate Change” on December 17-19, 2015.
- Prof Ashwani Pareek Organized, the 3<sup>rd</sup> International Plant Physiology Congress: Challenges and Strategies in Plant Biology research. December 11-14, 2015 (jointly with Indian Society for Plant Physiology, National Institute of Plant Genome Research and American Society of Plant Biology).
- Prof Atul Kumar Johri organised the 56<sup>th</sup> Annual Microbiology conference of Association of Microbiologists of India and International Symposium on Emerging Discoveries in Microbiology, 7-10 December 2015.

**30. Code of ethics for research followed by the departments:**

We do follow a code of research. All projects dealing with animals or transgenic are taken clearance from the concerned committees. Disposal of waste material is done as per the conditions. Plagiarism is checked all the time.

**31. Student profile programme-wise: (2015-16)**

Name of the Programme (refer to question no.)	Applications received	Selected		Pass percentage	
		Male	Female	Male	Female
<b>M.Sc</b>	6343	3	20		
<b>MPhil/PhD</b>	3221	7	12		

<b>PhD</b>	-	-	-		
<b>MPhil/PhD (JRF)</b>	<b>194</b>		<b>9</b>		

32. **Diversity of students: School does not keep any record in this regard as admission/evaluation is centralised**

<b>Name of the Programme (refer to no. 4)</b>	<b>% of students from the same universit</b>	<b>% of from other universities within the State</b>	<b>% of from universities outside the State</b>	<b>% of student from other countri</b>

33. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise. A substantial number clear NET (including toppers) and GATE. However, School does not have any record as most students leave the department immediately after completing M Sc.

34. Student progression: **Details information is available with the Admission Branch.**

<b>Student progression</b>	<b>Percentage against enrolled</b>
<b>UG to PG</b>	
<b>PG to M.Phil.</b>	
<b>PG to Ph.D.</b>	
<b>Ph.D. to Post-Doctoral</b>	
<b>Employed</b>	
<ul style="list-style-type: none"> <li>• <b>Campus selection</b></li> <li>• <b>Other than campus recruitment</b></li> </ul>	

<b>Entrepreneurs</b>	
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**35. Diversity of staff: Details information is available with the Administrative Branch.**

<b>Percentage of faculty who are graduates</b>	
<b>of the same University</b>	
<b>from other Universities within the State</b>	
<b>from universities from other States</b>	
<b>from Universities outside the country</b>	

**36. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period:** None. All faculty are Ph D holders at the time of appointment.

**37. Present details of departmental infrastructural facilities with regard to**

- a) Library: yes
- b) Internet facilities for staff and students: Yes
- c) Total number of classrooms: Four
- d) Classrooms with ICT facility: one having nearly 30 terminals.
- e) Students' laboratories: 2
- f) Research laboratories: 30

**38. List of doctoral, post-doctoral students and Research Associates**

- a) from the host Institution/University---

<b>Sl. No.</b>	<b>Name of the RA/Post-Doctoral Fellow/others</b>
<b>1.</b>	<b>Dr. Ardhendu Kr. Dash, (RA) working under Prof. B.C. Tripathy/Mr. D.S.</b>

Sl. No.	Name of the RA/Post-Doctoral Fellow/others
	Kothari Post Doctoral Fellow
2.	Mr. Praveen Kumar, R.A. with Dr. Ashis Nandi
3.	Mr. Rohit Joshi, R.A. working under Dr. Ashwani Pareek
4.	Dr. Nita Lakra, R.A. C/O Dr. Ashwani Pareek
5.	Mr. Mohd. Mahfooz Alam, Sr. Technical Assistant
6.	Dr. Budhi Sagar Tiwari, Prestigious Ramalingaswami Fellowship offered by DBT under Supervision Prof. B.C. Tripathy
7.	Mr. Suresh Kumar, (I) Lab. Attendant
8.	Dr. Maya Verma, UGC-Mr. D. S. Kothari Post Doctoral Fellow under Supervision Prof. B.C. Tripathy
9.	Dr. Suresh DVNS, Research Associate
10.	Dr. Ritu Kulsrestha, R.A.
11.	Ms. Manorama Patri, R.A. with Prof. B. N. Mallick
12.	Dr. Lakshmi Rani Iyer, P.I.-DST under women scientist, with Dr. Jai Shree Paul
13.	Dr. Tanveer Khan, P.I., Dr. Ashwani Pareek
14.	Dr. Niraj Kr. Srivastava, UGC for D.S. Kothari Doctoral Fellow with Dr. Deepak Sharma
15.	Dr. Surabhi Naik, UGC-Mr. D.S. Kothari Post Doctoral Fellow with Dr. Sneha Lata Bhadoriya
16.	Dr. Antresh Kumar, R.A. with Prof. Rajendra Prasad
17.	Dr. Saif Hameed, R.A. with Prof. Rajendra Prasad
18.	Dr. Pooja Rai, UGC-Dr. D.S. Kothari Post Doctoral Fellow with Prof. B.C. Tripathy
19.	Dr. Gautam Kumar, RA with Dr. Ashwani Pareek

Sl. No.	Name of the RA/Post-Doctoral Fellow/others
20.	Dr. Sumita, RA with Dr. Ashwani Pareek
21.	Dr. Rajesh Pujari, UGC-Dr. D.S. Kothari Post Doctoral Fellow with Dr. S. Gourinath
22.	Dr. Amit Kumar Dixit- Dr. D.S. Kothari Post Doctoral Fellow with Dr. S. Gourinath
23.	Dr. Awanish Kumar, UGC-Dr. D.S. Kothari Post Doctoral Fellow with Prof. Rajendra Prasad
24.	Dr. Pramod Kumar- Dr. D.S. Kothari Post Doctoral Fellow with Prof. P.K. Yadava
25.	Dr. Sajjan Singh, Assistant Registrar
26.	Mr. Dhananjay Kumar C/o Prof. B.C. Tripathy-UGC Dr. D.S. Kothari Post Doctoral Fellow
27.	Ms. Bindu I.S. UGC Dr. D.S Kothari Post Doctoral Fellow working under Prof. B.N. Mallick
28.	Mr. Bijay Kumar, UGC Dr. D.S Kothari Post Doctoral Fellow working under F
29.	Mr. Abhinav Kumar, UGC Dr. D.S Kothari Post Doctoral Fellow working under Prof. N.B. Sarin
30.	Dr. Pankaj Tripathy, RA with Prof. R. Madhubala
31.	Dr. Ashima Sinha, UGC Dr. D.S Kothari Post Doctoral Fellow working under Prof. Rajendra Prasad
32.	Dr. Somlata, DST INSPIRE Fellow, under Prof. Alok Bhattacharya
33.	Dr. V.S. Gowri, UGC Dr. D.S Kothari Post Doctoral Fellow working under Prof. R. Madhubala
34.	Dr. Intzar Ali, Dr. D.S. Kothari working under Prof. R. Prasad
35.	Ms. Priyanka Das, UGC Dr. D.S. Kothari Post Doctoral Fellow working

Sl. No.	Name of the RA/Post-Doctoral Fellow/others
	under Dr. Ashwani Pareek
36.	Dr. Naseem Akhtar, Ramanujan Fellowship, working under Prof. Rajendra Prasad
37.	Dr. Anil Kumar, UGC Dr. D.S. Kothari Post Doctoral Fellow working under Prof. P.K. Yadava
38.	Dr. Tamanna Anwar, DS Kothari Post Doctoral Fellow working under Dr. S. Gourinath
39.	Dr. Abhinav Grover, DST Inspire Faculty with Prof. N.B. Sarin
40.	Dr. Jeremy Dkhar c/o Dr. A. Pareek
41.	Dr. Ahmad El Sayad Ahmad Khalaf (Visiting Fellow)
42.	Dr. Neeraj Kumar Srivastava, (RA) working under
43.	Dr. Madhuri Singh, Dr. D.S. Kothari PDF, Awardee in Dr. S.S. Komath Lab
44.	Dr. Nita Lakra, Under Dr. Ashwani Pareek
45.	Neelam Prabha Negi, DST woman scientist in N.B. Sarin, Lab
46.	Dr. Vijay Kumar Verma, Dr. D.S. Kothari Post Doctoral fellow, in lab of Dr. S. Gourinath
47.	Dr. Asmita Samadder, DST post doctoral fellow in Nano Sciences and Technology under Prof. S.K. Abraham
48.	Namrata Khanbash- Post doctoral fellow for woman candidates
49.	Sheeba – Woman Scientist Fellow
50.	Dr. Mohd. Sharia, DST Post-Doctoral Fellow (Dr. D.S. Kothari)- Supervisor – Prof. Alok Mondal
51.	Ms. Rita Sharma, Ramalingaswami Fellow under Prof. Ashwani Pareek
52.	Ms. Monika Mishra, SRF of ICMR Fellowship (Research scholar at Devi Ahilya Vishvidyalys, Indore)- Supervisor- Prof. Deepak Sharma

Sl. No.	Name of the RA/Post-Doctoral Fellow/others
53.	Mr. Jitender Singh, D.S. Kothari Post Doctoral
54.	Dr. Neena Jain, Ramalingaswami Re-entry & fellowship from DBT , under Supervision - Prof. Alok Kumar Mondal
55.	Dr. Rajiv Kumar, Post Doctoral Fellow
56.	Dr. Rachaa Monga, Woman Scientist Scheme A (WOS-A)
57.	Dr. Kamendra Kumar, R.A DBT Under Supervisor of Prof. Deepak Sharma
58.	Dr. Peer Abdul Haseeb Shah, a UGC Dr. D.S Kothari post-doctoral fellowship under the supervisor of Prof. Alok K. Mondal
59.	Rashmi – DST young scientist in Nirala Ramchiraya Lab
60.	Gautam Biswar- as a research associate in Prof. Alok Bhattacharya Lab
61.	Dr. shipalipi Samantaray – Dr. D.S Kothari post-doctoral fellowship under the supervision of Prof. B.C. Tripathy
62.	Mr Kuskal Kumar Mahto, SRF/ICMR in Dr. Rajendra Prasad Lab Freo 1-3-15
63.	Dr. Shib Sankar Sen UGC Dr. D.S. Kothari post-doctoral fellow under the supervision of Prof. R. Madhubala
64.	Dr. Edwina Thomas UGC Dr, D.S. Kothari post-doctoral fellow under the supervision Dr. Atul K. Johri
65.	Dr. Ajay Kumar – UGC Dr. D.S Kothari post-doctoral fellow under the supervision of Prof. R.P. Singh
66.	Dr. Suresh Singh Yadav UGC Dr. D.S. Kothari post-doctoral fellow under the supervision of Prof. P.K. Yadava
67.	Ms. Divya Shrivastava, UGC – Dr. D.S. Kothari post-doctoral fellow under supervision of Prof. N.B.Sarin
68.	Ms. Kamal Ruhil Dr. D.S. Kothari post-doctoral Fellow supervision Prof. B.C. Tripathy

Sl. No.	Name of the RA/Post-Doctoral Fellow/others
69.	Mr. Anupam Mittal Dr. D.S. Kothari post-doctoral Fellow supervision Prof. S.K.. Goswami
70.	Dr. Virendra Singh Dr. D.S. Kothari Post Doctoral Fellow Supervisor- Prof. Rana Pratap Singh
71.	Dr. Ranjana Bhati S. Dr. D.S. Kothari Post Doctoral Fellow Supervisor- Prof. B.C. Tripathy
72.	Dr. Abhijeet Mishra UGC Dr. D.S. Kothari Post Doctoral Fellow Supervisor- Prof. Rana Pratap Singh
73.	Ms. Adyasha Bharahi, UCG Dr. D.S. Kothari Post Doctoral Fellow Supervisor- Prof. B.C. Tripathy

b) from other Institutions/Universities--- Nil

**39. Number of post graduate students getting financial assistance from the university.**

- a. M.Sc. Student (MCM fellowship) -15 (approx.) per year
- b. M.Sc. III semester students (DBT Fellowship) – 12-16 (approx.) per year

**40. Was any need assessment exercise undertaken before the development of new programme (s)? If so, highlight the methodology.**

Student-faculty committee and the graduate advisory committee periodically interact with the students. Recently we have revised the MPhil/PhD programme. Through this new programme, the students get well acquainted (both theoretical and practical knowledge) with the laboratory they are allotted. The students take the course on “fundamentals” which allows them to get well versed with the current knowledge in every field of life sciences. The course on “techniques” allows them to understand the principles of the latest techniques being used. They also are introduced to different instrumentation and their handling, and also handling of radioactivity. Besides they study subjects related to their area of

research. The students are evaluated on the practical/experiments they carry in their respective labs by a committee where they present their work. The feedback from the student is very positive.

**41. Does the department obtain feedback from:**

- a. Faculty on curriculum as well as teaching-learning-evaluation?  
If yes, how does the department utilise the feedback?

Periodically, the faculty committee discusses in details the teaching-learning and evaluation methodologies. After rigorous discussions, recommendations are adopted through the “Special Committee” (the academic body empowered to coordinate the teaching and research work, to approve courses of study; recommend names of the Examiners to Academic Council, etc. <http://www.jnu.ac.in/RTI/MANUAL8.pdf>)

- b. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilise the feedback?

The committees (Graduate advisory committee for MSc and MPhil/PhD meet the students to discuss their curriculum and the changes they require. The committee then submits its report to the Dean. The Dean then takes the action in consultation with other faculties.

- c. Alumni and employers on the programmes offered and how does the department utilise the feedback?

Not many comments come from them.

**42. List the distinguished alumni of the Department (maximum 10)**

1. Professor Seyed Ehtesham Hasnain, Jamia Hamdard University, Hamdard Nagar, New Delhi, 110062
2. Prof. U.C. Biswal, Former Vice-Chancellor, Sambalpur University, Sambalpur, Odisha.
3. Prof. Alok Bhattacharya, Former Vice-President, 2, Bahadur Shah Zafar Marg, ITO Cross, Delhi, 110002
4. Prof. B.C. Tripathy, Former Vice-Chancellor, Ravenshaw University, Cuttack-753003
5. Dr. Y.P. Rai, Chief Postmaster General, Andhra Pradesh Circle,
6. Mr. Ajit Kumar Seth, Former Cabinet Secretary, Government of India
7. Mr. Divyabh Manchanda, Former Ambassador of India, Republic of Macedonia

8. Dr. Niranjana Charaborty, Acting Director, NIPGR, New Delhi-110067
- 43. Give details of student enrichment programmes (special lectures / workshops / seminar) involving external experts.**
- Talks by eminent scientists throughout the year.
  - Summer and winter workshops and trainings.
  - Biosparks, Spandan: both organised by students.
  - Training, workshops on instrumentations.

- 44. List the teaching methods adopted by the faculty for different programmes.:**
- Teaching in JNU is through innovative methods. The SLS is equipped with all modern gadgets via, projectors, interactive board, computers, and all updated lab facilities with equipment. Apart from fixed time table for classroom teaching, the School arranges lectures both guest and special by eminent teachers from various institutions both national and international. Apart from this, students of the School are also encouraged to participate national and international conferences in India and abroad. Such students are encouraged to give feedback to fellow students by arranging school level seminars.

- 45. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?**
- We have the course uploaded on our website which is also given to the students. The GAC and SFC meet the students at least twice a semester to find out the way the courses are running and if they have any problems. The students convey their concerns to the committee, which is then given to the Dean. The Dean then takes action accordingly.

- 46. Highlight the participation of students and faculty in extension activities.**

Intense laboratory seminars/ journal clubs are organised by each faculty, which largely benefits the PhD students. Time to time we also have seminars by our faculty. Every year when the new M Sc and MPhil/PhD students take admission, we have a one-day symposium to introduce to the newcomers the area of research activities and the School in general.

The students organise “Biosparks” which is a scientific programme every year where all students and teachers participate.

**47. Give details of “beyond syllabus scholarly activities” of the department.**

Beyond syllabus are seminars by eminent scientists, industry personals and on technical details. Workshops for using different instrumentations are given. Course and hands on experience on the handling of radioactivity are done. We also have summer and winter schools.

**48. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details. None**

The School is not empowered to ask for any accreditation from external agencies. It is done at the university level.

**49. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.**

The School of Life Sciences has contributed enormously to human resources development in biological sciences. Its alumni are well placed in various universities/institutes all over the country and abroad. Many of them are in leadership positions and policy makers.

**50. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.**

A. Strengths:

- a. Innovative teaching
- b. Interdisciplinary approach in teaching and research
- c. Conducive academic environment
- d. Excellent infrastructural support

B. Weaknesses:

None

C. Opportunities and Challenges

Programs in Life Sciences at the Masters’ and Ph D levels were developed in the late 60s and early 70s with the emergence of the unifying concept of new biology that the same essential rules govern functions in all biological systems from bacteria to mammals. This approach had opened up space for

interdisciplinary pursuits. Our programs adopted almost all topics being taught in the domains of Botany and Zoology (like Biochemistry, Microbiology, Genetics/Genomics, Developmental Biology, Cell Biology, Genetic Engineering, Neurosciences, etc.). Our alumni have thus augmented the quality of teaching and research in terms of originality and scientific contents in their respective spheres of work.

However, over the decades, Biological sciences have undergone a transformative change with the emergence of newer and newer sub-disciplines. Therefore, teaching biology under a single umbrella of Life Sciences is a major challenge for us. To cope with the challenge, we have created four distinct research/teaching groups so that we can offer degrees (M Sc and Ph D) in Life Sciences with specialisation in these groups (details available in our prospectus at <https://admissions.jnu.ac.in//Prospectus/JNUEE/SLS.pdf>).

#### **51. Future plans of the department.**

Over the decades, Biological sciences have undergone a transformative change with the emergence of newer and newer sub-disciplines. Therefore, teaching biology under a single umbrella of Life Sciences is a major challenge for us. To cope with the challenge, we have created four distinct research/teaching groups so that we can offer degrees (M Sc and Ph D) in Life Sciences with specialisations along these groups (details available in our prospectus at <https://admissions.jnu.ac.in//Prospectus/JNUEE/SLS.pdf>). We anticipate that in coming years these groups will be strengthened and will accommodate the challenges of fast emerging areas of biology teaching and research

**Memberships of Boards/Committees (2012-13)**

- **Prasad R.**, Regional Editor, Journal of Biological Sciences; Regional Editor, Mycopathologia; Member of Editorial Board, FEMS Yeast Research; Member, Finance Committee, NII, New Delhi; Member, Building Committee, NIPGR, New Delhi; Member, DBT task force Biochemistry and Molecular Biology; Member DBT, Builder Programme; Member, Governing Council of the Institute of Liver and Biliary Sciences (ILBS); Member, Governing Council of Ambedkar Institute, Delhi University; Chancellor Nominee, Jammu University; Commissioner, International Commission of Yeast (ICY); National Contact Point, European Commission; and German research Ambassador.
- **Bhattacharya Alok**, Elected member of the executive committee of CODATA International (a member of ICSU), Paris.
- **Yadava P. K.**, Member, Advisory Committee, SAP in Biotechnology, Punjab University, Chandigarh; Member, Academic Committee, Institute of Interdisciplinary Studies, University of Allahabad; Member, UGC review Committee, UGC Centre of Excellence, Rajiv Gandhi University, Arunachal Pradesh; Member, Board of Studies in Botany, Banaras Hindu University, Varanasi; Member, Preparative Committee for Recruitment of Faculty in Biotechnology, South Asian University, New Delhi; Member, Departmental Research Committee in Biotechnology, Amity University, NOIDA, UP.; Member, Governing Body, Shaheed Bhagat Singh College and Bhagini Nivedita College, Delhi University, New Delhi; and Member, Selection Committee for Faculty, Central University of Jharkhand, Ranchi.
- **Kale R. K.**, Task Force to promote and develop quality faculty from SCs, STs and PwDs of Ministry of Human Resource Development of Government of India; Member of Academic Council of Pondicherry University; Member of Academic Council of Central University of Karnataka; Member of Standing Committee on SC/ST of UGC; Chairman of the Peer Team of National Assessment and Accreditation Council (NAAC) for Lonavla Education Trust's Dr. B.N. Purandare Arts and Smt. S.G. Gupta Commerce & Science College, Lonavla; Member of Review Committee of UGC to assess the past performance of Andhra Pradesh SET Agency i.e. Osmania University, Hyderabad; Member of Departmental Promotion Committee (DPC) of UGC for the post of Deputy Secretary and Joint Secretary; Chairman of UGC Expert Committee, to examine proposals of Schemes of Instrumentation Maintenance Facility; Member of Subject Expert of the Selection Committee for award of UGC Science Meritorious Fellowship, at Department of Zoology, University of Rajasthan; Chairperson of the Peer Team of NAAC, visit the Government First Grade College and Centre for PG Studies. Thenkanidiyoor, Udupi, Karnataka; Member of the Expert Committee of UGC to select the candidates under the scheme of Post-Doctoral Fellowship for SC/ST candidates for 2012-13; Member of the Task Force on Empowerment and Equity, Opportunities for Excellence in Science of Science and Engineering Research Board of Govt. of India; Member of Standing Committee on Academic Staff Colleges of UGC; Member of Selection Committee for Central University of Rajasthan; Subject

Expert for the Selection Committee for the post of Professor, Associate Professor and Assistant Professor in the Department of Physics, University of Pune; Member of CAGE Committee on National Mission on Teachers and Teaching (NMTT); Member of UGC Expert Committee for selection of awardees under the scheme of Post-Graduate Merit Scholarship for University Rank Holders for PG academic programmes; Member of Council of Vice-Chancellors of Central Universities, constituted by Ministry of Human Resource Development, Government of India; Member of Peer Team of NAAC for the CMS College of Science & Commerce, Coimbatore; Member of UGC Moderation Committee to finalize the result of UGC-NET; Chairman of the Peer Team of the National Assessment and Accreditation Council (NAAC), for the Christian Eminent Academy of Management, Professional Education & Research, Indore, Madhya Pradesh; Member of UGC Committee to revise SC/ST Reservation Roster; Member of UGC constituted Committee to prepare guidelines for the proposals for the establishment of Office of the Research and Integrity by CEIs to evolve and Sustain Mechanisms for funding advanced research and ensuing acceptable standard; Member of NAAC Peer Team to undertake the re-accreditation work of Shikshana Prasarak Mandali's Ramnarain Ruia College, Matunga, Mumbai; Member of National Monitoring Committee for Education of Scheduled Castes, Scheduled Tribes and Persons with Disabilities of MHRD; Member of the UGC constituted committee to monitor the OBC Reservation in Admissions in Central Educational Institutions maintained by UGC; Member of National Steering Committee of the UGC-INFONET Digital Library Consortium; Member of Academic Council of the Maulana Azad National Urdu University (MANUU), Hyderabad; Chairman of the NAAC Peer Team for inspection of R. K. Institute of Management and Computer Sciences, Bangalore; Member of Governing Board of INFLIBNET; and Chairperson of Indian Institute of Dalit Studies.

- **Madhubala R.**, Member DST-PAC in Biochemistry, Biophysics, Molecular Biology and Microbiology, 2013; Member Editorial Board Scientific Reports, A Nature Publishing House Group Journal <http://www.nature.com/srep/eap-ebm/index.html#molecularbiology>; Affiliate member Seattle Biomedical Research Institute, Seattle, USA.; **Programme Director, Global health training grant in Infectious diseases (2007-2011)**, supported by National Institute of Health, USA, to train graduate and post doctoral trainees in Infectious Diseases research. This project has support of \$750,000 and is for five years. This is a joint effort between Dr. K. Stuart from Seattle Biomedical Research Institute, and myself. We put together a consortium of Scientist from India and University of Washington, Seattle. Please see the web site: <http://www.sbri-india-gid.org/home/index.asp>; **editorial adviser Biochemical Journal**<http://www.biochemj.org/bj/bjedavpanel.htm>; Member of Academic Committee of the IMTECH (Chandigarh); Member of Academic Committee of CCMB (Hyderabad); Member editorial board of Journal of Parasitic Diseases, Indian Journal; Member editorial board of Asian Journal of Drug Metabolism and Pharmacokinetics, International Journal; and Regional Editor of American Journal of Biochemistry and Biotechnology, quarterly publications, <http://www.scipub.us/>.

- **Sarin N. B.**, On the panel of UGC Review Committee of SAP Programme of SMVD University Jammu; Member, Institutional Biosafety Committee, National Institute of Plant Genome Research, New Delhi, India; Member, course committee, Indira Gandhi National Open University, New Delhi, India; Member, Academic Committee, International Centre for Genetic Engineering and Biotechnology, New Delhi, India; Member, Selection Panel for NASI-SCOPUS YOUNG SCIENTIST AWARDS; Member, Selection Committee, Commonwealth Awards, UGC; Member, Selection Committee, Commonwealth Awards, MHRD; Member, Academic Committee NIPGR; Member, Academic Committee South Asian University (SAU); Session Chairperson at the National Plant Tissue Culture Conference, Mysore 2103; and National Coordinator Fascination of Plants Day.
- **Mallick B. N.**, Member Scientific Advisory Committee (SAC) of National Brain Research Centre (NBRC); UGC Nominee - External Expert member to CAS-V Advisory Committee, Dept of Zoology, BHU; Chairman of the sub-group for proposing “Future Directions” for preparation of “National Guidelines on Obstructive Sleep Apnea”; Judge for evaluation of presentations at Tagore International School (GK), New Delhi, 8 November, 2012; Session Chair, at XXX meeting of IAN, GND Univ., Amritsar; 27 – 30 October, 2012; Inauguration of Academic Staff College Refresher Course at Burdwan University, 2 November, 2012; Member Academic Committee of ICGEB, New Delhi; Member Academic Committee of CDRI, Lucknow; Member Institutional Animal Ethics Committee (IAEC), Institute of Liver and Biliary Sciences (ILBS), New Delhi; Regional Editor : The Open Sleep Journal; Editorial Board member : World Journal of Neurology; Editorial Board Member : Journal of Sleep Disorders & Therapy; Associate Editor: BMC Neuroscience; Associate Editor: Frontiers in Neurology – Sleep and Circadian Rhythm; Ad hoc Editorial Board Member: J Bioscience; and Peer Reviewed at least 8 international journal papers.
- **Rath P. C.**, Member, Board of Studies (BOS) in Zoology, BHU, Varanasi (2012-13); Member, Board of Studies (BOS) in Zoology, NEHU, Shillong (2012-13); Member, Academic Committee, NII, New Delhi (2012-13); Member, Academic Committee, CDRI, Lucknow (2012-13); Member, Governing Body, Kirorimal College, Delhi University, Delhi (2012-13); Member, Governing Body, Dayal Singh College, Delhi University, New Delhi (2012-13); Expert, Selection Committee, APJ Stya University, Gurgaon, 2012; Expert, Selection Committee, NIMR (ICMR), Delhi, 2012, 2013; Member, Expert Committee, Biochemistry (Syllabus & PhD), IGNOU, New Delhi, 2012, 2013; Member, Expert Committee, Life Sciences (Syllabus & Examination), Central University of Gujarat, Gandhinagar, 2012, 2013; Member, Expert Committee, Cluster Innovation Centre (Admission), Delhi University, Delhi, August 2012; Member, Expert Committee Research, Delhi State Cancer Institute (DSCI), Delhi, Feb 2013; and Consortium Advisory Committee (CAC) Member, National Agricultural Innovation Project (NAIP) of Indian Council of Agricultural Research (I.C.A.R.), Govt. of India, at National Dairy Research Institute (NDRI), Karnal. March 2013.
- **Natarajan K.**, Doctoral Committee, National Institute of Immunology; Academic Committee, National Institute of Immunology; Academic Committee, Indian Military Academy, Dehradun; Academic Committee, National Institute of Immunology;

Purchase Committee, NIPGR; and Institutional Biosafety Committee, Department of Biological Sciences, BITS, Pilani.

- **Singh Rana Partap**, Scientific Advisory Committee Member, Institute of Cytology and Preventive Oncology, ICMR Institute, Noida, UP, India. (2013); and Academic Council Member, Chhatrapati Shahu Ji Maharaj University, Kanpur, UP, India (2012).

### Memberships of Boards/Committees (2013-14)

- **Rajendra Prasad**, Regional Editor, Journal of Biological Sciences; Regional Editor, Mycopathologia; Member of Editorial Board, FEMS Yeast Research; Member, Finance Committee, NII, New Delhi; Member, Building Committee, NIPGR, New Delhi; Member, DBT task force Biochemistry and Molecular Biology ; Member, Governing Council of the Institute of Liver and Biliary Sciences (ILBS); Member, Governing Body ,NCCS, Pune; Chancellor Nominee, Jammu University; Commissioner, International Commission of Yeast (ICY) ; Coordinator, National Focal Point, European Commission; German Research Ambassador ; Vice President, Indian National Science Academy
- **R. Madhubala**, Member DST-PAC in Biochemistry, Biophysics, Molecular Biology and Microbiology, 2013; Member editorial board Scientific Reports, A Nature Publishing House Group Journal <http://www.nature.com/srep/eap-ebm/index.html#molecularbiology>; Affiliate member Seattle Biomedical Research Institute, Seattle, USA; Member of Academic Committee of CCMB (Hyderabad); Member editorial board of Journal of Parasitic Diseases, Indian Journal; Member editorial board of Asian Journal of Drug Metabolism and Pharmacokinetics, International Journal; Regional Editor of American Journal of Biochemistry and Biotechnology, quarterly publications, <http://www.scipub.us/>.
- **Neera Bhalla Sarin**, Organized National Science Day with DST-JNU in 2013; On the panel of UGC Review Committee of SAP Programme of SMVD University Jammu; Member, Institutional Biosafety Committee, National Institute of Plant Genome Research, New Delhi, India; Member, Academic Committee, International Centre for Genetic Engineering and Biotechnology, New Delhi, India; Member, Selection Panel for NASI-SCOPUS YOUNG SCIENTIST AWARDS; Member, Selection Committee, Commonwealth Awards, MHRD; Member, Academic Committee South Asian University (SAU).; National Co-ordinator for Fascination of Plants Day by European Plant Science Organization (EPSO).
- **B. N. Mallick**, Member Scientific Advisory Committee (SAC) of National Brain Research Centre (NBRC); UGC Nominee - External Expert member to CAS-V Advisory Committee, Dept of Zoology, BHU; Chairman of the sub-group for proposing “Future Directions” for preparation of “National Guidelines on Obstructive Sleep Apnea”; **Selection Committee Chair/Member** for selection of faculty at various Universities; **Session Chair** at various meetings.; Regional Editor : The Open Sleep Journal; Editorial Board member : World Journal of Neurology; Editorial Board Member : Journal of Sleep Disorders & Therapy; Associate Editor : BMC Neuroscience; Associate Editor : Frontiers in Neurology – Sleep and Circadian

Rhythm; Ad hoc Editorial Board Member : J Bioscience; Peer Reviewed at least 8 international journal papers

- **K. Natarajan**, Doctoral Committee, National Institute of Immunology; Academic Committee, National Institute of Immunology; Academic Committee, Indian Military Academy, Dehradun; Academic Committee, National Institute of Immunology; Purchase Committee, NIPGR; Institutional Biosafety Committee, Department of Biological Sciences, BITS, Pilani.
- **Rohini Muthuswami**, Member of Academic Board NIPGR.
- **Sushil K. Jha**, External Examiners, NBRC, Manesar for setting up question paper for the subject Molecular and Cellular Neuroscience, November 2013; External Member, NBRC, Manesar to conduct interview for the admission in Ph.D. and Integrated Ph.D. program. May 27<sup>th</sup> and 30<sup>th</sup>, 2013.

### **Memberships of Boards/Committees (2014-15)**

- **Rajendra Prasad**, Regional Editor, Journal of Biological Sciences; Regional Editor, Mycopathologia; Member of Editorial Board, FEMS Yeast Research; Member, Finance Committee, NII, New Delhi; Member, Building Committee, NIPGR, New Delhi; Member, DBT task force Biochemistry and Molecular Biology; Member, Governing Council of the Institute of Liver and Biliary Sciences (ILBS); Member, Governing Body, NCCS, Pune; Chancellor Nominee, Jammu University; Commissioner, International Commission of Yeast (ICY); Coordinator, National Focal Point, European Commission; German Research Ambassador ; Vice President, Indian National Science Academy.
- **Alok Bhattacharya**, Journal of Genetics, Indian Academy of Science, Bangalore; Proceedings of the Indian National Science Academy; Scientific Reports, Nature Publishing Group; PLoS Neglected Tropical Diseases; Research Council of CSIR-Central Salt & Marine Chemicals Research Institute; Research Council of CSIR-Institute of Himalayan Bioresource Technology; Chairman, DBT task force on Bioinformatics, Computational & Systems Biology; Expert group on Bioinformatics of ICMR; Apex Committee of INSPIRE Faculty Fellowship DST/INSA; Governing Council, CSIR
- **Sudha Mahajan Cowsik**, International Biophysics Congress, Brisbane, Australia Aug.3-7, 2014
- **R.N.K. Bamezai**, Governing Body Member, National Institute of Animal Biotechnology (a DBT Institute), Hyderabad; Expert Group Member on CAR-Neuromuscular Disorders, ICMR, New Delhi; Member Finance Committee, NII, New Delhi; Member Medical Sciences Research Committee, CSIR, New Delhi; Co-Chair and Member of the Task Force on Human Genetics and Genomics, DBT, New Delhi.
- **P.K. Yadava**, President, Peoples Council of Education (till 20<sup>th</sup> May 2015); Member Selection Committee, DU; Member, Review Committee for CAS in Botany, University of Gujarat, Rajkot; Member, Board of Studies in Life Sciences, Central University of Gujarat, Gandhinagar.

- **R.K. Kale**, Academic Council of Pondicherry University; Executive Council of Doon University; Member of Editorial Board of Indian Journal of Experimental Biology. Published by CSIR- National Institute of Science Communication & Information Resource, New Delhi; Member of Editorial Board of Indian Journal of Traditional Knowledge Published by CSIR- National Institute of Science Communication & Information Resource, New Delhi.
- **R. Madhubala**, Member of Fellowship Scrutiny Committee (Biological Sciences) by the National Academy of Sciences, India, 2015; Research Council member of IICB, Kolkata; Member Sectional Committee, 09 for Microbiology and Immunology (Biology of Viruses, Bacteria and Parasites, Microbial Genetics and Genomics and Immunology) INSA 2014-2016; Editorial Board Member of Proceedings of Indian National Science Academy as Editor of Health Sciences group. 1<sup>st</sup> Jan 2015 onwards; Member DST-PAC in Biochemistry, Biophysics, Molecular Biology and Microbiology, **2013**; Member editorial board Scientific Reports, A Nature Publishing House Group Journal <http://www.nature.com/srep/eap-ebm/index.html#molecularbiology>; **Affiliate member** Seattle Biomedical Research Institute, Seattle, USA; **Member Project Review Committee**, South Asian University (SAU) 2015; **Member editorial board** of Journal of Parasitic Diseases, Indian Journal; **Member editorial board** of Asian Journal of Drug Metabolism and Pharmacokinetics, International Journal; **Regional Editor of American Journal of Biochemistry and Biotechnology**, quarterly publications, <http://www.scipub.us/>
- **B. N. Mallick**, Member Scientific Advisory Committee (SAC) of National Brain Research Centre (NBRC); UGC Nominee - External Expert member to CAS-V Advisory Committee, Dept of Zoology, BHU; Selection Committee Chair/Member for selection of faculty at various Universities; Co-Chaired the Indo-Swiss symposium session on “Sleep and Depression : Biomarker and neuroplasticity” during 1<sup>st</sup> Global Meet on Biological Psychiatry, Sept 25-28, 2014, New Delhi, Marriott Hotel; Key note session Chair during XXV Meeting Indian Soc. Chronobiology, March 27-29, 2015, Pt. Ravi Shankar Shukla Univ., Raipur, Chhattisgarh; Regional Editor : The Open Sleep Journal; Editorial Board member :World Journal of Neurology; Editorial Board Member :Journal of Sleep Disorders & Therapy; Associate Editor : BMC Neuroscience; Associate Editor :Frontiers in Neurology – Sleep and Circadian Rhythm; Ad hoc Editorial Board Member :J Bioscience; Peer Reviewed several international journal papers
- **P.C. Rath**, Member, Governing Body Meetings, Dayal Singh College, Delhi University. 30.01.15, 08.05.15; Expert, Faculty Selection Committee (Zoology), Zakir Hussain College, Delhi University. 21.02.15; Expert, Faculty Selection Committee (Zoology), Mayetri College, Delhi University. 03-05. 03. 15; Expert-Biology, Kishore Vaigyanik Prosthahan Yojona (KVPY) interviews for Class XI students, Department of Science & Technology (DST), Govt. Of India, New Delhi, 16-18 Feb., 2015; Expert-Life Sciences, Faculty Selection Committee, Ravenshaw University, Cuttack, July & Aug., 2014; Expert-Biotechnology, Faculty Selection Committee, Utkal University, Bhubaneswar, 07.02.15; Expert, Board of Studies Meeting, Biotechnology, APJ Sty

University, Gurgaon, 24.01.15; Expert-Life Sciences, Faculty-interviews for study abroad, International Affairs, Delhi University, 25.02.15; Expert-Life Sciences, paper setting, SET Exam-Maharashtra Govt., Pune University, 12-14 March 2015; Expert-Board of Studies Meeting, Biochemistry, North Eastern Hill University (NEHU), Shillong, 06.04.15; Consultation Meeting by VC on Ravenshaw University New Campus, ICSSR, New Delhi, 09.05.15; **Recognition/other activity:** Vice President, Association of Gerontology India (AGI) 2014-16; Member, Academic Committee, National Institute of Immunology (NII), New Delhi; Member, Academic Committee, Central Drug Research Institute (CDRI), Lucknow; Member, Editorial Board, Frontiers in Cell & Developmental Biology, Switzerland; Reviewer: International Journals (Mol. Biol. Rep., Mol. Neurobiol., e-CAM, Gene, Sci. Rep., J. Genet., BIMRI)

- **Ajay Kumar Saxena**, American society of Microbiology; American crystallographic Association; European crystallographic association; Adhoc reviewer of Journal of Biological Physics; Adhoc reviewer of International Journal of Biological Macromolecules; Adhoc reviewer of Acta Crystallographica F.
- **K. Natarajan**, Doctoral Committee, National Institute of Immunology; Academic Committee, National Institute of Immunology; Academic Committee, Indian Military Academy, Dehradun; Purchase Committee, NIPGR ; Institutional Biosafety Committee, Department of Biological Sciences, BITS, Pilani
- **Shweta Saran**, Member of the core pre-NET-JRF Exam Committee, CSIR since 2005; Governing body member of Miranda House, Delhi University, 2014-till date; Governing body member of Kirorimal College, Delhi University-2013-2014
- **Rohini Muthuswami**, Membership of Boards/Committees outside JNU: Member of Academic Board NIPGR Number of students awarded research degrees under your supervision: NONE
- **Sushil K. Jha**, External Examiners, NBRC, Manesar for setting up question paper for the subject Molecular and Cellular Neuroscience, November 2014; External Member, NBRC, Manesar to conduct interview for the admission in Ph.D. and Integrated Ph.D. program. May 15<sup>th</sup> and 19<sup>th</sup>, 2015; External Member, the animal dissection monitoring committee, NBRC, Manesar, 2014.
- **Niti Puri**, Member of IAEC (Institutional animal ethics committee), South Asian University, Akbar Bhawan, Chanakyapuri, New Delhi; External Expert on Student Review Committee (SRC) for PhD students, Dept. of Biotechnology, Delhi Technological University, New Delhi; External Examiner for MTech, Dept. of Biotechnology, Delhi Technological University, New Delhi; Life member, Indian Immunology Society, India.
- **Suresh Abraham**, Member of interview panel for Scholarship Selection Interviews organised by DAAD, The German Academic Exchange Service, for Academic Year 2015-2016.
- **Jaishree Paul**, Annual Platinum member of American Society of Microbiology, 2014.

## Memberships of Boards/Committees (2015-16)

- **P.K. Yadava**, Member, Executive Council, Central University of Gujarat, Gandhinagar; Member, Selection Committee, ICMR; Member, Selection Committee, Public Service Commission, Uttarakhand; Member, Board of Studies, Centre for Advanced Studies in Botany, Institute of Science, Banaras Hindu University
- **R. Madhubala**, Nominated as a Council Nominee on the Board of Governors of IIT Roorkee by the Minister of Human Resource Development as Chairperson of the Council of IIT's from 9<sup>th</sup> March-2016-9<sup>th</sup> March 2019; Selected by HRD implementation committee to coordinate and organize GIAN course on Bioassay and Bioefficacy Models: Tools, Targets and Technologies, 24<sup>th</sup> July-5<sup>th</sup> Aug. 2016; Member NER Twining R and D program, DBT **2015- 2018**; Member of the second Expert Committee of SERB Young Scientists-Life Sciences, Indian Institute of Science and Education (IISER) 2015 -2018; Member Research Council of IICB, Kolkatta (2013-2016); Nominated member of Fellowship Scrutiny Committee (Biological Sciences) by the National Academy of Sciences, India, 2015; DST-PAC sectional Committee Task force member 2013-2015; Member Scientific Advisory Committee (SAC) of Rajendra Memorial Research Institute of Medical Sciences, Indian Council of Medical Research 2016 onwards; Senior Jury, INSPIRE AWARDS, Department of Science and Technology, India, 2012-present; Member Sectional Committee, INSA, 2013-present; Nominated Member INSA-DST Inspire Faculty Award Biomedical: Selection Committee, 2014-present
- **B. N. Mallick**, Member Scientific Advisory Committee (SAC) of National Brain Research Centre (NBRC); UGC Nominee - External Expert member to CAS-V Advisory Committee, Dept of Zoology, BHU Member BOS, Centre for Biological Sciences, Central Univ., South Bihar, Patna; Selection Committee Chair/Member for selection of faculty at Vidyasagar University and Tripura Central University; Regional Editor : The Open Sleep Journal; Editorial Board member :World Journal of Neurology; Editorial Board Member :Journal of Sleep Disorders & Therapy; Associate Editor : BMC Neuroscience; Associate Editor :Frontiers in Neurology – Sleep and Circadian Rhythm; Ad hoc Editorial Board Member :J Bioscience Evaluated/Peer Reviewed several international journal papers; Evaluated/Peer Reviewed several projects from various Organizations; Evaluated/Peer Reviewed several CVs for top Awards in the country
- **P.C. Rath**, Expert Member, Board of Studies in Biochemistry Meeting at Biochemistry Department, North Eastern Hill University, Shillong, April 6, 2015; sExpert Member, Governing Body, Screening Meeting for Principal, at Dayal Singh Evening College, Delhi University, May 8, 14 & 26, 2015; External Examiner, Ph.D. Viva-Voce Examination, at Zoology Department, Banaras Hindu University, Varanasi, June 22, 2015; Presentation & Evaluation of students, at Biotechnology Department, APJ Stya University, Gurgaon, June 30, 2015; Expert Member, Innovation Research Project for Teachers Screening Committee, at University of Delhi, July 16-17, 2015; (2015) Governing Body Meeting, at Dayal Singh College, Delhi University, August 18; (2015) Expert Member, Selection Committee Meeting for Teachers, at Zoology Department, Gargi College, University of Delhi, Oct. 6-7; (2015) Expert Member, Screening

Committee Meeting for Common Wealth Fellowships (M.Sc. & Ph.D.) at Ministry of Human Resource & Development (MHRD), Govt. of India, R.K. Puram, New Delhi, Oct. 2; (2016) Chair, Session for presentation by Young Investigators, International Conference on Cancer, at School of Life Sciences, J.N.U., Feb. 10; (2016) Acting Dean at School of Life Sciences, Animal Ethics & Training Workshop for Researchers, Feb., 11 (Inauguration) & 14 (Valedictory Function); (2016) Governing Body Meeting, Kirorimal College, Delhi University, March 9 & April 8; Rath P.C. (2016) Expert Member, Review Committee Meeting for the UGC-Centre of Excellence at Guru Nanak Dev University, Amritsar, March 12-13.

- **K. Natarajan**, Doctoral Committee, National Institute of Immunology; Purchase Committee, NIPGR Institutional Biosafety Committee, Department of Biological Sciences, BITS, Pilani
- **Shweta Saran**, Member of the core pre-NET-JRF Exam Committee, CSIR since 2005; Governing body member of Miranda House, Delhi University, 2014-till date; Governing body member of Kirorimal College, Delhi University-2013-till date; Life member of Indian Society of Cell Biology; Indian Society of Developmental Biology; Life member of Indian Society of Gerontology
- **Rana Pratap Singh, Advisory Committee Member**, UGC-HRD Centre, DDU Gorakhpur University, UP, India (2015-); **Member**, Indo-Overseas Fellowship Committee, DST, India. (2015).
- **Ashis K. Nandi**, Member of Academic Committee of National Institute of Plant Genome Research, for the period of two years from Jan 09, 2016.
- **Sushil K. Jha**, External Member, NBRC, Manesar to conduct interview for the admission in Ph.D. and Integrated Ph.D. program. June 7<sup>th</sup>, 2015.
- **Niti Puri**, Member of IAEC (Institutional animal ethics committee), South Asian University, Akbar Bhawan, Chanakyapuri, New Delhi, Life Member, Indian Immunology Society, India
- **Suresh Abraham**, Member of the German Academic Exchange Service selection committee for the PhD program in Germany.
- **Jaishree Paul**, Annual Platinum member of American Society of Microbiology; Life member of Indian Society of Translational Research, India; Life member of Probiotic Association of India.
- **Soumya Prasad**, Member of the Steering Committee of the Association for Tropical Biology & Conservation, Asia-Pacific Chapter; Chair of the Organising and Scientific Committee for the VII International Frugivores and Seed Dispersal Symposium (2020).

## EVALUATIVE REPORT OF SCHOOL OF BIOTECHNOLOGY

Jawaharlal Nehru University (JNU), New Delhi was one of the first six Universities in India to initiate a Postgraduate teaching and research programme in the field of Biotechnology in 1985. Since 1985, it was running as the Special Centre for Biotechnology (CBT) under the joint sponsorship of the University Grants Commission (UGC) and the Department of Biotechnology (DBT), Ministry of Science & Technology, Govt. of India. To begin with, it was started to initiate Biotechnology education programme with an impetus to generate a workforce that could turn into a substantially trained pool to meet the country's demands. Considering the growth of Biotechnology at an international level, its applications in general spheres of life and the significant contributions made by the faculty of the Centre for Biotechnology, the Executive Council of JNU resolved to elevate the status of the Special Centre for Biotechnology to that of a School of Biotechnology (SBT) in 2006. Over the years, Biotechnology programme at JNU has established itself as a leading academic programme both from the teaching and research point of view. The faculty of the School is internationally recognized for their contribution to basic and applied aspects of Biotechnology research.

All faculty members are distinguished researchers in their area of specialisation and all of them have well-equipped labs. Besides that, the School has one CIF(Central Instrumentation Facility), one M.Sc. Lab, one Recombinant product develop Lab(GLP Std.) and an upcoming P3 facility having state of the art equipment procured by funds from JNU, UGC, DST, DBT, ICMR, CSIR, etc.

Since admission into M.Sc and Ph.D programme of the School is through entrance examination complying with reservation policy of the Government, we are able to attract students from diverse background including foreign students from neighbouring countries. Since the University provides weightage of five marks to female students appearing in the entrance examination(Ph.D programme) the ratio of male to female students in the School

is almost equal. The School has produced distinguished scholars throughout the years. Several companies have approached the School for campus recruitment. However, most of our students opt not to go for industry job immediately after M.Sc. and pursue higher studies (Ph.D. in India or abroad). Also, since Biotechnology is an application based discipline, our students having gained experience in research during Ph.D. enables them to realise their actual research potential and enhance their innovative capabilities. After having completed Ph.D. and gained post-doctoral training abroad, many of our graduates have established their own Biotech companies, are CEO/s Vice Presidents of the Biotech companies or are

Working in well known Biotech companies of the country and abroad e.g. Panacea Biotech, Hindustan Lever Ltd. M/s Arbro Pharmaceuticals Ltd., Biocon and M/s Premas Biotech. Pvt.Ltd. etc. are only to name a few companies where our graduates are either working or are heading the companies. Many of our graduates are faculty members in Universities abroad, and in institutes/universities in India.

Both M.Sc and Ph.D programmes are revised continuously as per deliberations in the Special Committee of this School meant for the purpose. We believe that continuous up gradation of knowledge and skills is required to maintain quality in this fast growing area of Biotechnology. There is very little drop out of students in either the Ph.D or M.Sc. programme less than five percent.

Over the past five years, we have designed and developed the cutting edge laboratories both for individual faculty members as well as central facilities to provide hand-on training to students.

The faculty members have been participating in refresher courses conducted by UGC sponsored Academic Staff College both as participants and resource persons.

Most of the teachers are associated with various national and international bodies in different capacities such as editors of several national and international journals, members of Task Forces on biotechnology set by DBT,DST of Govt. of India etc., members of academic councils/governing bodies of many colleges, universities and other

research organizations like IITs and as Ph.D thesis evaluator for various universities and research organizations.

The faculty members have collaborated with other national institutes like NII, ICGEB, ICMR etc. as well as foreign universities like Cambridge, Malaya, Norway, Germany, etc. There is a diverse range of research carried out by the Department both eukaryotic and procaryotic biology, transcriptional requirement, infectious diseases and system biology.

A very large number of DBT, DST & ICMR projects have been completed successfully by the Department, and many more are in the pipeline.

The faculty has published more than 70 papers in the last five years with an impact factor averaging more than 3 .

The Department has received assistance in the form of SAP(UGC), FIST(DST) PURSE(DST) and Capacity Build-up(UGC) in recent years.

It is strongly felt that for fulfilling the mandate of interdisciplinary teaching and research in Biotechnology with a problem solving approach, a post M.Sc. research based M.Tech./M.S programme ought to be started in Industrial and applied biotechnology with focus on problems related to health care delivery e.g. development of diagnostic kits etc. production of recombinant proteins, their purification and stabilization, generation and propagation of strains expressing intermediate metabolites and creation of transgenic animals and plants, which will need a strong interdisciplinary faculty and infrastructural facilities.

In this programme, the students would carry out a research project which will be guided and monitored by a team of well-qualified faculty. Such a programme will attract a lot of interest from industry and candidates sponsored by industry can be trained. If adequate infrastructure for such purposes is built up, these facilities can also be utilized for developing new and novel products that would strengthen the ongoing University-Industry interaction. This will also generate revenue and help immensely in the placement of students in the industry. The School would like to expand in the areas of nanobiotechnology, drug design and delivery, bioprocess engineering, medicinal & Bio-organic Chemistry, proteomics and metagenomics in the future.

To conclude the M.Sc. Biotechnology programme of JNU is the most sought after Biotechnology programme of the country. The teaching programme of the School of Biotechnology has been ranked No.1 in the Nation by Biospectrum through a National Survey. Recently the M.Sc programme of this School has been ranked as A+ out of 32 universities running DBT supported M.Sc General Biotechnology Programme. It continues to maintain its standard and excels in teaching and research programme. In 2007, 100% of our students qualified National Scholarship exams conducted by CSIR/DBT/ICMR. Our graduates routinely hold ranks among top 10 or 20 in GATE examination. The research carried out by the faculty members is published in International journals of repute and are well cited. The School of Biotechnology has also been successful in taking the research carried out in the lab to the industry and have transferred technologies to industry, which is developing the technologies to be taken from bench to bedside. JNU is thus one of the first universities to have transferred technologies that have been taken to the market or are in the process of being taken to the market. Several newer technologies are in the pipeline with several patents filed by/granted to the faculty members of the School.

## Evaluative Report of the Department

( 1 April 2012- 31 March 2016)

1. Name of the Department: School of Biotechnology, Jawaharlal Nehru University  
New Delhi
2. Year of establishment : 1985 (as a Centre of Biotechnology)  
2006 (as a School of Biotechnology)
3. Is the Department part of a School/Faculty of the university?  
Yes, School of Biotechnology is one of the Schools of the University
4. Names of programmes offered **M.Sc and Ph.D Programme**
5. Interdisciplinary programmes and departments involved
6. Courses in collaboration with other universities, industries, foreign institutions, etc.  
No
7. Details of programmes discontinued, if any, with reasons - No
8. Examination System: **Semester System**
9. Participation of the department in the courses offered by other departments
10. Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/Asst. Professors/others)

	Sanctioned	Filled	Actual (including
<b>Professor</b>	6	7*	
<b>Associate Professors</b>	13	7	
<b>Asst. Professors</b>	4	7**	

\*Includes 1 Re-employed faculty

\*\*Includes 4 UGC Recharge faculty

**11. Faculty profile with name, qualification, designation, area of specialisation, experience and research under guidance**

Sl. No.	Name of Faculty	Designation	Qualification	Date of joining	Area(s) of specialization
1.	Prof. Uttam K. Pati	Professor & Dean	Ph.D.	12/9/1994	Cancer Biology
2.	Prof. Rakesh Bhatnagar	Professor (Re-employed)	Ph.D, F.N.A, F.N.A.Sc., F.A.Sc.	1989	Vaccine Development
3.	Prof. Aparna Dixit	Professor	M.Sc. M.Phil, Ph.D.	25/10/1996	Gene Expression
4.	Prof. Rajiv Bhat	Professor	Ph.D.	16/4/1990	Protein Folding Aggregation & Solubilization
5.	Prof. K.J. Mukherjee	Professor	Ph.D.	1/8/1991	Metabolic Engineering & Bioprocess Designing
6.	Prof. P.K. Dhar	Professor	Ph.D.	4/3/2015	System & Synthetic Biology
7.	Prof. D. Bharadwaj	Professor	Ph.D.	25/5/ 2015	Functional Genomics of Complex human diseases
8.	Dr. Devapriya Choudhury	Associate Professor	Ph.D.	1/3/2002	Computational Biology, mechanistic Enzymology

9.	Dr. S.S. Maitra	Associate Professor	Ph.D. M.I.E	30/7/1990	Metagenomics
10.	Dr. Deepak Gaur	Associate Professor	Ph.D.	28/2/2014	Infectious Diseases
11.	Dr. Rupesh Chaturvedi	Associate Professor	Ph.D.	23/6/2014	Enteric Diseases
12.	Dr. B.S. Balaji	Associate Professor	Ph.D.	4/2/2015	Chemical Synthesis
13.	Dr. Rajesh Mishra	Associate Professor	Ph.D.	9/2/2015	Chemical Biology, Amyloid
14.	Dr. Suneel Kateriya	Associate Professor	Ph.D.	28/4/2015	Rhodopsin Mediated Signaling, Optogenetics, Channelopathy and Ciliopathy
15.	Dr. S. M. Rajala	Assistant Professor	M.Sc. Ph.D.	11/4/2008	Molecular Virology
16.	Dr. Swati Tiwari	Assistant Professor	Ph.D.	8/5/2008	Molecular Cell Biology
<b>Sl. No.</b>	<b>Name of Faculty</b>	<b>Designation</b>	<b>Qualification</b>	<b>Date of joining</b>	<b>Area(s) of specialization</b>
17.	Dr. Ranjana Arya	Assistant Professor	Ph.D.	2/6/2008	Cell Biology
18.	Dr. Abhinav	Assistant Professor(U	Ph.D.	7/8/2013	Bioinformatics

	Grover	GC)			
19.	Dr. Ravi Tandon	Assistant Professor(U GC)	Ph.D.	9/6/2014	Immunology
20.	Dr. Manoj Kumar Sharma	Assistant Professor(U GC)	Ph.D.	28/5/2014	Plant Biotechnology
21.	Dr. Jaydeep Bhattacharya	Assistant Professor(U GC)	Ph.D.	7/7/2014	Biophysics/Nanobiotechnology

**12. List of Senior Visiting Fellows, adjunct faculty, emeritus professors**

- I. Dr. Bhavender Paul, 3005 Del Ray Street, San Mateo, CA 94403, USA, visiting faculty from 21.1.2014 to 20.3.2014
  - II. Dr. Govindjee, Department of Plant Biology, Department of Biochemistry and Center of Biophysics and Computational Biology, University of Illinois at Urbana-Champaign, visiting faculty from 2<sup>nd</sup> week of January 2015 to 14<sup>th</sup> March 2015.
  - III. Dr. Saguna Verma, Department of Tropical Medicine, Medical Microbiology and Pharmacology, John A. Burns School of Medicine, University of Hawaii at Manoa (UHM), Honolulu, Hawaii, visiting faculty from 3<sup>rd</sup> week of August 2016 to 3<sup>rd</sup> week of September 2016.
13. Percentage of classes taken by temporary faculty – programme-wise information - N/A
14. Programme-wise Student Teacher Ratio
- |       |     |
|-------|-----|
| M.Sc. | 2:1 |
| Ph.D  | 4:1 |

15. Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual

Sl. No.	Post	Sanctioned Post	Filled	Vacant
1.	Section Officer	1	1	0
2.	Private Assistant	1	1	0
3.	Assistant	1	1	0
4.	Technical Assistant	2	0	2
5.	Laboratory Assistant	3	1	2
6.	Lab Attendant	5	3	2
7.	Office Assistant	1	1	0
8.	Store Keeper	1	1	0

16. Research thrust areas as recognised by major funding agencies

Identified since Inception	Ongoing	Modified to, if any, and when UGC approval reference no. and date
<p><b>-Communicable and Noncommunicable Diseases</b></p> <p><b>-Bioprocess Technology</b></p>	<p><b>-Molecular &amp; Cellular Engineering using omics platforms with special reference to proteomics</b></p> <p><b>-Chemical and Synthetic Biology</b></p> <p><b>-Metabolic Engineering</b></p>	<p>NA</p>

**Future Thrust area proposed**

1. *Medical Biotechnology*
2. *Protein design & engineering*
3. *Bioprocess engineering*
4. *Functional Genomics of Complex Diseases*
5. *Systems and Synthetic Biology*

17. Number of faculty with ongoing projects from a) National b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise. **Annexure – I**
18. Inter-institutional collaborative projects and associated grants received
- a. National collaboration b) International collaboration
19. Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received: DST-FIST, DBT (in lakhs)

Year	Name of the Funding / Agency (Indian/ International)	Building	Equip ment	Contingency	Staff	Total
<b>Year I</b>	DBT Builder *	640	660	4.00	29.784	1333.784
<b>Year II</b>				4.00	53.616	57.616
<b>Year III</b>				4.00	75.696	79.696
<b>Year IV</b>				4.00	67.896	71.896
<b>Year V</b>				4.00	49.176	53.176
<b>Consumable/ Chemicals/ Books</b>						
<b>2011 –12</b>	DBT	50.43676	-	2.0	-	52.43676
<b>2012 –13</b>		42.48	-	2.0	-	44.48
<b>2013 –14</b>		59.515	-	2.0	-	61.515
<b>2014 –15</b>		44.49	-	2.0	-	46.49
<b>2015 –16</b>		48.71482	-	2.0	-	50.71482
<b>2012 – 2015</b>	UGC/DST/JNU					

20. Research facility / centre with
- state recognition

- national recognition
- international recognition

### **AWARD(S)/MEMBER (S)/FELLOWSHIP (S)**

#### **Prof. Uttam Pati**

- Member, Advisory Committee UGC, Central Asian Studies Program.
- Member, INMAS Research Council Meeting, DRDO, 2016.

#### **Prof. Rakesh Bhatnagar**

President's Award, 2016 for best Innovation by Shri Pranab Mukherjee,

1. President of India.
2. J.C. Bose National Fellow by Department of Science and Technology.
3. Life Member, Indian Immunology Society.
4. Life Member, Biotechnology Society of India.
5. Executive Member, All India Biotech Association, New Delhi.
6. Member, American Society of Microbiology.
7. Member, Technical Committee, "BIRAC, New Delhi.
8. Chairman, Vallabhbhai Patel Chest Institute, University of Delhi.
9. Co-Chairman, DBT Task Force on Human Resource Development

#### **Prof. Aparna Dixit**

1. Member Expert, International Travel Grant Committee, University Grants Commission, New Delhi.
2. Member Expert, Interface Selection Committee for Post Doctoral Fellowship schemes, University Grants Commission, New Delhi.
3. Member Expert, Selection Committee for the appointment of Principle of Aditi Mahavidyala, University of Delhi, New Delhi-110039. (15-16)
4. Member, Selection Committee, for recruitment to the post of Scientist I and II, All India Institute of Medical Sciences, New Delhi.
5. Member Expert, Advisory Committee under the Special Assistance Programme (SAP), Panjab University, Chandigarh. (15-16)
6. Member Expert, Selection Committee for the appointment of Associate Professor, Department of Biochemistry, University of Kashmir, Srinagar.
7. Member, Subject Expert Committee (Life Sciences), Women Scientist Scheme-A, Department of Science and Technology, Ministry of Science and Technology, New Delhi.
8. Member, Academic Committee, Biotechnology, Jiwaji University, Gwalior.

9. Member, an Expert committee to interview candidates for Raman Fellowships for Post Doctoral Research in USA, University Grants Commission, New Delhi.
10. Subject Expert, Biotechnology, NBA Accreditation team, for accreditation of UG/PG programmes in various Engineering colleges in India.
11. Member, Task Force, BUILDER programme, Department of Biotechnology, Ministry of Science and Technology, New Delhi.

### **Prof. Rajiv Bhat**

1. Elected Secretary, Indian Biophysical Society
2. Member Academic Committee CDRI, Lucknow, 2014-2016
3. Member Academic Committee, ICGEB, New Delhi, 2009-2011
4. Member Academic Committee, CCMB, Hyderabad, 2014-2016
5. Member Academic Committee, Institute of Microbial Technology (IMTech), Chandigarh, 2013-2015
6. Member Expert Committee to evaluate Translational Health Sciences and Technology Institute (THSTI), Gurgaon for affiliation to JNU, 2013.
7. Member Standing Committee on Recognized Institutions 2011-2013.
8. Member Committee of Studies, Interdisciplinary Biotechnology Unit, Aligarh Muslim University, 2014-2016.
9. Member Board of Management, Interdisciplinary Biotechnology Unit, Aligarh Muslim University, 2016-2021.
10. Member Committee of Studies, Centre for Interdisciplinary Research in Basic Sciences 2012-2016.
11. Member Advisory Committee, Department of Biotechnology, Guru Nanak Dev University, Amritsar, 2013-2015.

### **Prof. K. J. Mukherjee**

1. Member SAC, DBT-ICT centre for Energy Bioscience, Mumbai
2. Member SAC, DBT-IOC Faridabad
3. Member SAC, DBT- ICGEB, New Delhi
4. Member Board of Studies, University School of Chemical Technology, Guru Gobind Singh Indraprastha University, New Delhi

### **Prof. Pawan Kr. Dhar**

1. Member-Expert for interviewing biotechnology candidates for Japanese Government [MEXT]
2. Member, Selection Committee for interviewing candidates for Scientist positions (CIAB), Mohali,
3. Member, Interviewed candidates for Scientist C position, Ministry of Environment, Forests and Climate Change, Indira Paryavaran Bhavan, New Delhi

### **Prof. Dwaipayan Bharadwaj**

1. Elected Fellow of the National Academy of Sciences (F.N.A.Sc.), India (2011).
2. MDRF-UOM Oration Award (2011)
3. DBT-CREST Award (2011)
4. Designated Faculty-Mentor in the US D43 Millennium-Promise Award to Centre for Chronic Disease Control, New Delhi.
5. Associate Editor BMC Endocrine Disorder.
6. Editorial Board Member Diabetes
7. Executive Member Indian Society of Human Genetics

### **Dr. Deepak Gaur**

1. 2016 Visitors Award for Research constituted by the President of India. Awarded as part of the JNU Molecular Parasitology Group for Best Research by the honourable President, Shri Pranab Mukherjee at RashtrapatiBhawan; March 14, 2016.
2. 2015 Elected Fellow, Guha Research Conference (GRC) at the annual meeting at Bodh Gaya, November 28 – December 02, 2015.
3. 2015 Consultant, United States Agency for Internal Development (USAID) to review their Malaria Vaccine Development Program (MVDP).
4. 2015 Member of the Program Advisory Committee of the UNESCO Regional Center for Biotechnology (RCB), Faridabad, Haryana, India.
5. 2014 National Bioscience Award for Career Development announced by the Department of Biotechnology, Government of India; October 2015.

### **Dr. Suneel Kateriya**

1. Max Planck Visiting Fellowship (2012-2016) from Department of Science and Technology-India and Max Planck Group-Germany
2. Indian Biophysical Society-Life Member.
3. The Indian Science Congress Association-Life Member.
4. Association of Microbiologist of India-Life Member
5. Elected member of National Academy of Sciences, India.
6. Life-member of the “Society of Biological Chemists”, India
7. Life member of the “Indian Society of Cell Biology”, India

### **Dr. S.M. Rajala**

1. Member, Indian Virological Society.
2. Member, International Society for infectious diseases.

### **Dr. Swati Tiwari**

1. Visitor's Award for 'Research' to the 'Molecular Parasitology Group' (2016)
2. Life-member of the "Society of Biological Chemists", India
3. Life member of the "Indian Society of Cell Biology", India

### **Dr. Ranjana Arya**

1. Life Member Indian Society of Cell Biologist, India
2. Life Member-Society of Biological Chemists, Bangalore, India

### **Dr. Abhinav Grover**

1. **BRICS and EAEU International Youth Forum 2015:** Represented as Head of Delegation. Individually got first place in 'Breakthrough Technologies in Medicine'.
2. **BRICS Youth Summit 2015:** Represented India under Scientific Cooperation Theme

### **Dr. Manoj Kumar Sharma**

1. Associate Editor, Frontiers in Plant Science (shift to 26)
2. Ramalingaswami Re-entry Fellowship (Continuing from March 2014).

### **Dr. Ravi Tandon**

1. Young Scientist Award in 56<sup>th</sup> Annual Conference of Association of Microbiologist of India (AMI-2015) & International Symposium on "Emerging Discoveries in Microbiology" JNU, New Delhi on December 9, 2016.
21. Special research laboratories sponsored by / created by industry or corporate bodies

## RESEARCH FACILITIES

School has an excellent “state-of-the-art” research facilities for training in the modern areas of biological sciences. These include:

- ❖ Central Instrumentation Facility
- ❖ Recombinant Product Development Facility of GLP standard
- ❖ Biosafety Level 3 Facility
- ❖ Spectroscopic Facility
- ❖ Microcalorimetric Facility
- ❖ Microscopic Facility
- ❖ Protein production and purification Facility

22. Publications: **Annexure – II**
23. Details of patents and income generated
24. Areas of consultancy and income generated:

### **Consultancy project in the area of Bioprocess engineering and recombinant protein production**

25. Faculty selected nationally / internationally to visit other laboratories / institutions / industries in India and abroad
26. Faculty serving in
  - a. National committees

### **Rakesh Bhatnagar**

2. Member, Technical Committee, “BIRAC, New Delhi.
3. Chairman, Vallabhbhai Patel Chest Institute, University of Delhi.
4. Co-Chairman, DBT Task Force on Human Resource Development

### **Aparna Dixit**

1. Member Expert, International Travel Grant Committee, University Grants Commission, New Delhi.
2. Member Expert, Interface Selection Committee for Post Doctoral Fellowship schemes, University Grants Commission, New Delhi.
3. Member Expert, Selection Committee for the appointment of Principle of Aditi Mahavidyala, University of Delhi, New Delhi-110039. (15-16)
4. Member, Selection Committee, for recruitment to the post of Scientist I and II, All India Institute of Medical Sciences, New Delhi.
5. Member Expert, Advisory Committee under the Special Assistance Programme (SAP), Panjab University, Chandigarh. (15-16)
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7. Member, Subject Expert Committee (Life Sciences), Women Scientist Scheme-A, Department of Science and Technology, Ministry of Science and Technology, New Delhi.
8. Member, Academic Committee, Biotechnology, Jiwaji University, Gwalior.
9. Member, an Expert committee to interview candidates for Raman Fellowships for Post Doctoral Research in USA, University Grants Commission, New Delhi.
10. Subject Expert, Biotechnology, NBA Accreditation team, for accreditation of UG/PG programmes in various Engineering colleges in India.
11. Member, Task Force, BUILDER programme, Department of Biotechnology, Ministry of Science and Technology, New Delhi.

### **K. J. Mukherjee**

1. Member SAC, DBT-ICT centre for Energy Bioscience, Mumbai
2. Member SAC, DBT-IOC Faridabad
3. Member SAC, DBT- ICGEB, New Delhi
4. Member Board of Studies, University School of Chemical Technology, Guru Gobind Singh Indraprastha University, New Delhi

### **Rajiv Bhat**

1. Member Selection Committee for Faculty/Scientists at University of Delhi, National Institute of Immunology, Institute of Genomics and Integrative Biology, Regional Centre for Biotechnology, New Delhi, Guru Nanak Dev University, Amritsar, CFTRI, Mysore, University of Raipur.
2. Chairman, Selection Committee for Faculty and Scientists, National Institute of Immunology, 2016.
3. Chairman, Committee to Review Admission Policy of JNU, 2012.

4. Chairman, Committee to examine 5 year Admissions data and to look into the weightage for viva voce marks for admission in JNU, 2012.
5. Member of Committee for looking into selection committee criteria and eligibility qualifications for direct recruitment of teachers in JNU, 2011.
6. Member Committee for preparing “JNU Vision 2020 and Beyond” 2011.
7. Member Advisory Committee, Communication and Information Services Centre, JNU 2016-2018.
8. Member Academic Audit Committee for JNU affiliated institutions-CCMB, Hyderabad, 2014.
9. Member Advisory Committee, Advanced Instrumentation Research Facility, JNU 2014-2016
10. Member Academic Committee CDRI, Lucknow, 2014-2016
11. Member Academic Committee, ICGEB, New Delhi, 2009-2011
12. Member Academic Committee, CCMB, Hyderabad, 2014-2016
13. Member Academic Committee, Institute of Microbial Technology (IMTech), Chandigarh, 2013-2015
14. Member Expert Committee to evaluate Translational Health Sciences and Technology Institute (THSTI), Gurgaon for affiliation to JNU, 2013.
15. Member Standing Committee on Recognized Institutions 2011-2013.
16. Member, Hub Advisory Committee, Transdisciplinary Research Cluster, JNU, 2014-
17. Member Special Committee Special Centre for Nanosciences, 2013-2015; 2015-2017
18. Member Special Committee, School of Computational and Integrative Sciences 2015-18
19. Member, Centre Committee, Centre for Community Medicine and Social Health, 2014-2016.
20. Member School Level Purchase Committee, School of Physical Sciences and School of Environmental Sciences, JNU, 2014-2016.
21. Member Committee of Studies, Interdisciplinary Biotechnology Unit, Aligarh Muslim University, 2014-2016.
22. Member Board of Management, Interdisciplinary Biotechnology Unit, Aligarh Muslim University, 2016-2021.
23. Member Committee of Studies, Centre for Interdisciplinary Research in Basic Sciences 2012-2016.
24. Member Advisory Committee, Department of Biotechnology, Guru Nanak Dev University, Amritsar, 2013-2015.

### **Dwaipayan Bharadwaj**

1. Invited subject expert member in the field of Biotechnology in the Question Paper Setters Committee Meeting for DVT-JRF programme BET 2017.
2. Invited subject expert member in the field of Biotechnology for Selection Committee for short-listing Commonwealth Scholarships applications 2016-17, Ministry of Human Resource Development.

3. Invited subject expert member in the field of Biotechnology for Selection Committee for Korean Government Scholarships 2016-17, Ministry of Human Resource Development.
4. Invited subject expert member in the field of Biotechnology for Selection Committee for Israel Government Scholarships 2016-17, Ministry of Human Resource Development.
5. Invited expert member of the Review Committee of 5<sup>th</sup> Annual Ramalingaswami Conclave 2015 held at RCB Biotech Science Cluster Campus, Faridabad, Haryana, 20<sup>th</sup> December 2015.
6. Elected Executive Committee Member, Indian Society of Human Genetics (2013-2015, 2015-2017).
7. Coordinator of Indian Diabetes Consortium (INDICO): Largest research consortium of basic scientists and physicians in the country.

### **Pawan Dhar**

1. Member-Expert for interviewing biotechnology candidates for Japanese Government [MEXT]
2. Member, Selection Committee for interviewing candidates for Scientist positions (CIAB), Mohali,
3. Member, Interviewed candidates for Scientist C position, Ministry of Environment, Forests and Climate Change, Indira Paryavaran Bhavan, New Delhi.

### **Rajesh Mishra**

1. Member Biotechnology programme Advisory Committee, M. S. University, Baroda

b) International committees

c) Editorial Boards

### **Dwaipayan Bharadwaj**

2. Consulting Editor, Diabetes (2013-2016)
3. Associate Editor, BMC Endocrine Disorders
4. Editorial Board Member, Nature Scientific Reports
5. Editorial Board Member of “Frontiers in Gastrointestinal Sciences”.

### **Dr. Manoj Kumar Sharma**

1. Associate Editor, Frontiers in Plant Science

d) any other (please specify)

27. Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs).

**Biotechnology Refresher Course conducted by the University from time to time.**

28. Student projects

- percentage of students who have done in-house projects including inter-departmental projects **100%**
- percentage of students doing projects in collaboration with other universities / industry / institute

29. Awards/recognitions received at the national and international level by **Prof. Uttam Pati**

- Guha Research Award (GRC)

**Prof. Rakesh Bhatnagar**

- President's Award, 2016 for best Innovation by Shri Pranab Mukherjee, President of India.

**Prof. Dwaipayan Bharadwaj**

- Elected Fellow of the National Academy of Sciences (F.N.A.Sc.), India (2011).
- MDRF-UOM Oration Award (2011)
- DBT-CREST Award (2011)
- Designated Faculty-Mentor in the US D43 Millennium-Promise Award to Centre for Chronic Disease Control, New Delhi.

**Dr. Deepak Gaur**

- 2016 Visitors Award for Research constituted by the President of India. Awarded as part of the JNU Molecular Parasitology Group for Best Research by the honourable President, Shri Pranab Mukherjee at Rashtrapati Bhawan; March 14, 2016.

- 2014 National Bioscience Award for Career Development announced by the Department of Biotechnology, Government of India; October 2015.

**Dr. Suneel Kateriya**

- Max Planck Visiting Fellowship (2012-2016) from Department of Science and Technology-India and Max Planck Group-Germany

**Dr. Swati Tiwari**

- Visitor's Award for 'Research' to the 'Molecular Parasitology Group' (2016)

**Dr. Abhinav Grover**

- **BRICS and EAEU International Youth Forum 2015:** Represented as Head of Delegation. Individually got first place in 'Breakthrough Technologies in Medicine'.
- **BRICS Youth Summit 2015:** Represented India under Scientific Cooperation Theme

**Dr. Manoj Kumar Sharma**

- Ramalingaswami Re-entry Fellowship (Continuing from March 2014).

**Dr. Ravi Tandon**

- Young Scientist Award in 56th Annual Conference of Association of Microbiologist of India (AMI-2015) & International Symposium on "Emerging Discoveries in Microbiology" JNU, New Delhi on December 9, 2016.
  - Invited speaker award in DST-Inspire Internship Science Camp-2015 on 6.11.2015 at the Botany Department, Allahabad University.
30. Seminars/ Conferences/Workshops organised and the source of funding (national / international) with details of outstanding participants, if any.

**Annexure - III**

31. Code of ethics for research followed by the departments  
**Follow Institutional Ethics Committee and Biosafety Committee Regulations.**

32. Student profile programme-wise:

Name of the Progra	Year	No. of Seat	No. of student s	Selected		Dro p Out	Pass percentage	
				Ma le	Female		Male	Female
<b>M.Sc.</b>	2012	30	30	14	16	Nil	14	<b>16</b>
	2013	30	26	15	11	1	14	<b>11</b>
	2014	30	20	10	10	1	9	<b>10</b>
	2015	32	22	10	12	2	<b>They will pass out in May 2017 &amp; 2016 batch will pass out in May</b>	
	2016	30	29	10	19	Nil		
<b>Ph.D</b>	2012		8	1	7			
	2013		11	4	7			
	2014		17	5	12			
	2015		28	11	17			
	<b>2016</b>		<b>18</b>	<b>7</b>	<b>11</b>			

33. Diversity of students

Name of the Programme (refer to no. 4)	% of students from the same universit	% of from other universities within the State	% of from universities outside the State	% of student from other countri
<b>M.Sc</b>	N/A	8%	91%	<b>1%</b>
<b>Ph.D</b>	<b>5%</b>	<b>14%</b>	<b>80%</b>	<b>1%</b>

34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.  
**90% Students Selected in NET / GATE**

35. Student progression

Student progression	Percentage against enrolled
UG to PG	
PG to M.Phil.	
PG to Ph.D.	80%
Ph.D. to Post-Doctoral	60%
Employed <ul style="list-style-type: none"> <li>• Campus selection</li> <li>• Other than campus recruitment</li> </ul>	
Entrepreneurs	10%

36. Diversity of staff

Percentage of faculty who are graduates	
of the same university	20%
from other universities within the State	
from universities from other States	80%
from universities outside the country	

37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period

38. Present details of departmental infrastructural facilities with regard to

- |   |           |
|---|-----------|
| a. Library -                                    | 1260 nos. |
| b. Internet facilities for staff and students - | Yes       |
| c. Total number of classrooms -                 | 3 nos.    |
| d. Class rooms with ICT facility -              | 3 nos.    |
| e. Students' laboratories -                     | 3 nos.    |
| f. Research laboratories -                      | 21 nos.   |

39. List of doctoral, post-doctoral students and Research Associates
- a. from the host institution/university - **NIL**
  - b. from other institutions/universities - **15 nos.**
40. Number of post graduate students getting financial assistance from the university. – **100%**
41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.

**Courses are revised and restructured from time to time and approved by Special Committee**

42. Does the department obtain feedback from
- d. Faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilise the feedback?  
**Yes**
  - e. students on staff, curriculum and teaching-learning-evaluation and how does the department utilise the feedback?  
**Yes**
  - f. Alumni and employers on the programmes offered and how does the department utilise the feedback? **No**
43. List the distinguished alumni of the Department (maximum 10)
- 1. Dr. Rajeev Soni-Former President and founder Premas Biotech and currently President Patanjali Research Institute of Ayurvedic Sciences.
  - 2. Dr. Arshad Jilani- President and CSO Progeneca, Montreal, Canada
  - 3. Dr. K. Sridevi- Vice President Biosimilars, INTAS, Ahmedabad
  - 4. Dr. Jitendu N. Roy- President Innobate Technologies, Delhi
  - 5. Dr. Manoj Joshi- R&D Director, Skincare-Unilever, Bangalore
  - 6. Dr. D. Prasanna Kumar- Head, Formulations Division, Lupin Biotechnology Div., Pune

7. Prof. Ipsita Roy-Professor, University of Westminster, London, UK
  8. Prof. Jai K. Kaushik-Professor NDRI, Karnal
  9. Prof. Gobardhan Das- Professor, Centre for Molecular Medicine, JNU
  10. Dr. Shams Yazdani- Former Group leader and Senior Scientist ICGEB, New Delhi
  11. Dr. Bhagwati Prasad Gupta- Associate Professor, McMaster University, Canada
  12. Dr. Anandasankar Ray-Associate Professor University of California, Riverside
  13. Dr. Ashutosh Tiwari-Associate Professor and Director Biochemistry & Molecular Biology Programme, Michigan Technological University, USA
  14. Dr. Sangeeta Chawla-Lecturer, University of York, UK
- 
44. Give details of student enrichment programmes (special lectures/workshops / seminar) involving external experts.  
**The School organises Seminars and special lectures throughout the year. Besides the students organise every year an Annual Symposium “BioEpoch.”**
  45. List the teaching methods adopted by the faculty for different programmes.  
**All modern methods of teaching including IT is being used. Self-assessment is done from time to time**
  46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?  
**DBT Advisory Committee monitors M.Sc. teaching programme.**
  47. Highlight the participation of students and faculty in extension activities.  
**Students organise and Annual Sports day and other extracurricular activities throughout the year**
  48. Give details of “beyond syllabus scholarly activities” of the department.  
**Regular Seminars and Conference both national and international are organized every year. Also, BioEpoch Annual Symposium is coordinated by the students.**
  49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.

**DBT has granted a School as No. 1 in national survey of Biotech. Biospectrum has also graded our School as no.1 in the country.**

50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.

**Faculty have filed several patents, developed technology and transferred to the industry. The faculty is also highly prolific in publishing quality papers in International high impact journals.**

51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.

### **Strengths**

1. High-Quality students
2. Diverse background and experience of faculty
3. Student teacher ratio is one of the best in the country
4. Interdisciplinary atmosphere to promote excellence
5. National Character of students

### **Weaknesses**

1. Funding far less than capacity to contribute in research
2. Primitive infrastructure and administrative management
3. Complicated disorganised purchase procedures counteractive to scientific excellence
4. Lacking proper and modern building infrastructure
5. Lacking proper Computer facilities

### **Opportunities**

Enormous scope in the expansion of the programme with availability of modern tools applicable to health, industry and agriculture sector

### **Challenges**

Challenges from other developing Nations to stay at the high-end of research and development.

## 52. Future plans of the department.

### Future Plan

It is strongly felt that for fulfilling the mandate of interdisciplinary teaching and research in Biotechnology with a problem-solving approach, an integrated M.Sc.-Ph.D. programme in Biotechnology is proposed. Each research project of the student will be guided and monitored by a team of well-qualified faculty. The idea is to attract the best talent after college education who are interested in research as a career and to provide them exposure to cutting edge-research related to industry, medicine and plant sciences. This will also cut short the Ph.D. programme by a year as the Master's students would be well trained in research project in the 2<sup>nd</sup> year of their Master's course.

Further, the following programmes and facilities are proposed to be created:

1. Modernization of M.Sc. lab facilities for hands-on training in Bioinstrumentation as per Prime Minister's Skill India Programme.
2. Creating Centre of Excellence in Communicable and non-communicable diseases.
3. Modernization of Central Instrumentation Facility especially creating Next generation sequencing facility along with supercomputing facility for analysis of big data with appropriate storage space.
4. Cutting-edge animal facility for biomedical research particularly small animals including zebra fish facility.
5. Strengthening and supporting the already existing Chemical and Synthetic Biology programme at JNU.
6. To promote interaction with industry partners for facilitating transfer of technology.
7. Promoting collaborations in interdisciplinary and trans-disciplinary areas within different Schools of JNU.

**RESEARCH PROJECTS ONGOING (SPONSORED):**

1. **Pati U.**, CVD Biomarker profiling in individuals with high Lp(a) Level by antibodies and antigen array, Indian Council of Medical Research(ICMR).
2. **Pati U.**, Role of Pentanucleotide repeat sequences (PNR) in Triplex formation and apo(a) gene regulation, sponsored by Indian Council of Medical Research (ICMR).
3. **Pati U.**, “Role of P53 as a molecular sensor of oxygen in inducing apoptosis in Hypoxic Cancer Cells” funded by ICMR – 2013 – 2016.
4. **Pati U.**, Role of triplex DNA in transcriptional regulation of Cardio-Protective NOS<sub>2</sub> Gene”, Funded by ICMR 2012 – 2015.
5. **Bhat R.**, DBT-JNU Interdisciplinary Life Science Programme for Advanced Research and Education in the area “From molecules to systems: exploring the biological space using chemical and synthetic biology”, Department of Biotechnology (2012-17).
6. **Mukherjee K.J.**, From Molecules to Systems: exploring the biological space using chemical and synthetic Biology, Department of Biotechnology, 2012- 2017.
7. **Grover A.**, “DST INSPIRE Award Grant” 2012 to 2017 Sponsored by DST.
8. **Grover A.**, “Metabolic engineering for production of terpenoids in tobacco plants” 2013 – 2016 sponsored by DBT.
9. **Grover A.**, “High-throughput virtual screening of natural compound libraries and biochemical assessment of the identified novel inhibitors for checking Alzheimer plaque pathology”, form 2013 – 2016 sponsored by DST.
10. **Mishra R** Stability and Folding mechanism of alpha-amylase: 01-07-2015 to 30—6-2018, UGC sponsored

**Publication List from 2013 – 16.**

1. A Singh & U. **Pati** CHIP stabilizes amyloid precursor protein via proteasomal degradation and p53-mediated trans-repression of -secretase, *Aging Cell* (2015), 1-10, Doi: 10.1111/accel.12335
2. Mohammad Azam, Saud I. Al-Resayesa, Agata Trzesowska-Kruszynskab, Rafal Kruszynsk, Ambarish Verma, U. **Pati**. Apoptosis induction by chiral anionic binuclear Zn(II) complexes based on (1*S*,2*S*)-(+)-Cyclohexanediamine in HCT cells with different p53 status. *Inorganic Chemistry* (2014)46
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4. E Madan, R Gogna, P Kuppusamy, M Bhatt, A Ali Mahdi, U **Pati**. SCO2 Induces p53-Mediated Apoptosis by Thr<sup>845</sup> Phosphorylation of ASK-1 and Dissociation of ASK-1-TRX Complex 2012 *Mol Cell Biol* (2013) 33, No 7, 1285-1302.
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6. R Gogna, E Madan, P Kuppusamy and U. **Pati**. Re-oxygenation causes hypoxic tumor regression through restoration of p53 wild-type conformation and post-translational modifications, *Cell Death and Disease*, 3, e286; doi:10.1038/cddis.2012.15, 2012
7. R Gogna, E Madan, P Kuppusamy, U. **Pati**. P53 core domain modifications determine apoptotic and necrotic death in cancer cells. *Antioxidant & Redox Signaling* (doi: 10.1089/ars.2011.4103)16, No. 5, 2012
8. R Gogna, E Madan, B Keppler, U. **Pati**. Gallium compound GaQ3-induced Ca<sup>2+</sup> signaling triggers p53-dependent and independent apoptosis in cancer cells, *British Jour Pharmacology*(2011. doi: 10.1111/j.1476-5381.2011.01780) 166, 617–636,

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9. Manish M, Singh S, **Bhatnagar R.** “Preparation and Characterization of PLGA Encapsulated Protective Antigen Domain 4 Nanoformulation.” *Methods Mol Biol.* **2016**, 1404:669-81.
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**FORMAT-VI**

YEAR---WISE PLAN OF WORK PROPOSED TO BE DONE IN THE MAJOR THRUST AREAS:

Sl.No.	Thrust Area	Year	Details Proposed Work
<b>1.</b>	<b>Medical Biotechnology</b>		
	(a) Vaccine Development Faculty: Group I <b>Prof. Rakesh Bhatnagar</b> <b>Dr. Deepak Gaur</b> <b>Dr. Rupesh Chaturvedi</b> <b>Dr. Abhinav Grover</b> <b>Dr. Manoj Sharma</b> <b>Dr. Ravi Tandon</b> <b>Dr. Jaydeep Bhattacharya</b>	I	<b>(a) Identify novel virulence factors that influence <i>Aeromonas hydrophila</i>/Anthrax/<i>Plasmodium falciparum</i>/<i>H. pylori</i>/Human immunodeficiency Virus/infection and pathogenesis.</b> <b>(b) Construction of recombinant measles viral genes encoding structural proteins and RNA dependent RNA Polymerase. Generation of</b>
	(b) Development of recombinant virus to target cancer cells using measles viral genome backbone <b>Dr. S.M. Rajala</b>		
	(c) Oxygen biology & Microenvironment <b>Prof. Uttam Pati</b>	II	<b>(a) Functionally characterize the role of the novel virulence proteins in the biology of the infectious organism.</b> <b>(b) Generation of recombinant complete viral genome.</b> <b>(c) Role of re-oxygenation</b>

Sl.No.	ThrustArea	Year	DetailsProposedWork
	(d) Glycobiology/ Metabolic disorders Glyco proteins play important roles in biological, pathological and immunological processes. In order to have normal cellular pathology, correct salivation or glycosylation profile of proteins is essential. Defect singly cosylation may result from deficient glycan synthesis or defective transfer of glycanmoiety to the protein back bone. Lately, genetically determined abnormalities of the glycosylation processes have been identified as a cause of severeskelet almuscle diseases	III	(a) <b>Validate the vaccine potential of the different novel proteins for the development of novel vaccines.</b> (b) <b>Rescue of recombinant virus from packaging cell line. Evaluation of foreign gene to be inserted into pre-constructed recombinant viral genome.</b>
	(e) g.Inclusion Body Myopathy caused due to mutation in keysialic acid bio synthetic enzyme, GNE. In the present study we aim to identify novel path ways affecting disease mechanism such as GNE myopathy.	IV	(a) <b>Molecular epidemiology to analyse naturally acquired immunity against the novel antigens identified above in human population.</b> (b) <b>Arming of virus with foreign genes with known functions of proapoptosis, antianigiogenic activity and immuno modulators Rescue of</b>
			(c) <b>FRET analysisin MSC between p53&amp;HIF1a</b> (d) <b>Identification of novel cellular pathways that may affect the disease mechanism of metabolic</b>

Sl.No.	ThrustArea	Year	DetailsProposedWork
		V	(a) Develop and optimize fermentation/alternative processes for the up-scale production of the novel vaccine candidate antigens. (b) Evaluation of tumorlytic activity of recombinant virus using invasive
<b>2.</b>	<b>Protein Design and Engineering</b>		
	<p>The project will attempt to design proteins resistant to mutational and/or environmental perturbations which will be useful for the understanding of the specific role of protein misfolding in neurodegenerative, metabolic diseases and cancer. Another goal of the project is to design and develop synthetic protein based bio-catalysts that are capable of functioning in semi-aqueous environments.</p> <p>Group2:</p> <p><b>Prof. Aparna Dixit Prof. Rajiv Bhat Dr. Devapriya Choudhury Dr. Rajesh Mishra</b></p>	I	<b>Identification of candidate proteins that are most amenable (or most resistant) to misfolding under mutational or</b>
		II	<b>Biophysical and biochemical</b>
		III	<b>Characterization of the folding pathways of the wild-type candidate proteins both <i>in vitro</i> as well as <i>in vivo</i>. In silico simulation studies of the dynamics of the candidate proteins in native as well as per</b>
		IV	<b>Expression and purification of mutant proteins and characterization of their</b>
		V	<b>Analysis of results. Further simulation studies and design of second generation mutants. Their</b>
<b>3.</b>	<b>Bioprocess Engineering and Systems Biology</b>		

Sl.No.	ThrustArea	Year	DetailsProposedWork
	The overall objective of this research work is to apply the tools of systems biology to bioprocess development thereby integrating these two disciplines under the common umbrella of industrial systems	I	<b>In the first year work plan we will analyse this transcriptomic data using bioinformatic tools. For this we plan to develop models of regulatory flux balance analysis (rFBA)</b>
	Have been working on bioprocess optimization for recombinant protein production and also using metabolic engineering tools for enhanced metabolite production in <i>E.coli</i> . We have done high cell density cultures to improve recombinant protein yields to gram levels per liter. Various fed batch strategies have been analyzed with online and offline tools to improve cellular physiology and improve expression. Similarly various gene knock-ins and knock-out have been used to improve theme tabolic flux through specific pathways thus designing hosts with better metabolite yields.	II	<b>We will use this integrated transcriptomic, proteomic, metabolomic model of the cell to design multiple knock-in</b>
		III	<b>In the third year we plant extend this work to design metabolite over producers using metabolic engineering. Cellular physiology would be analyzed by sophisticated offline tools</b>
	We plan to extend this work to help in the rational design of host plat forms with improved expression capabilities. We have data on transcriptomic and proteomic profiling of strains under high cell density conditions.	VI	<b>In the fourth and fifth years we plan to use these improved hosts for scale up and technology development. We propose to design and demonstrate platform technologies where the improved host systems would be useful for the production of arrange of bio-molecules including proteins and metabolites.</b>
	Group3:  <b>Prof.K.J.Mukherjee Dr.S.S.Maitra Prof. Pawan</b>	V	

## EVALUATION REPORT OF SCHOOL OF COMPUTER & SYSTEMS SCIENCES

JNU is one of the premier institutions in the country to start academic programmes in the area of Computer Science as early as mid-seventies. Anticipating the demand to meet the growing national needs, School started M.Phil and Ph.D. programmes in the area of Computer Science in the year 1977. In 1985 a three year MCA programme was also launched. This was again among the first few such programmes in the country. As the Industry did not value much the M.Phil programme, the school started with M.Tech degree course equivalent to M.Phil in 1986 giving the option to pursue either M.Phil or M.Tech.

Currently, School attracts a larger number of students seeking admission to its programmes. The School takes pride that it admits students from rural and socially weaker backgrounds in significant numbers and adds high value to them so that they get high recognition in a highly competitive market. Ph.D. programme of the School of Computer & Systems Sciences is also highly respected in professional circles. While around a thousand of our alumni are already serving the industry and some of them reach the top echelons of their organisations, nationally and internationally, quite a few of them have launched their own enterprises which are thriving.

The curriculum designed for all the courses lays the theoretical foundation of Computer Science well supported by practical knowledge imparted. The syllabus is regularly updated to include fast growing and changing industrial needs and keeping core base intact. From time to time, new courses are introduced to keep pace with state of the art research across the globe. The School has been offering specially designed courses in Computer Applications to the students of the other Schools/ Centres also as outreach programmes. These courses are much sought after electives opted by the students from School of Languages, Literature and Cultural Studies. This also contributes strengthening in interdisciplinary studies in the University.

The faculty of the School is highly qualified and engaged in active research that is published in reputed journals and conference proceedings. Over the years, the faculty has developed thrust areas of research as given below.

- Data and Web Mining and Pattern Recognition and Medical Imaging
- Wireless Communication, Mobile Computing, Ad-hoc Networks  
Performance Modelling of Communication Networks
- Artificial Intelligence and Machine Learning
- Parallel Computing, Distributed Systems and Grid Computing
- Computational Neuroscience and Bioinformatics
- Software Oriented Architecture
- Databases and Data Warehousing

The faculty members have been involved in collaborative research work with faculty member from other institutions in the country and abroad in their individual capacity. The School has also completed the research projects sponsored by MIT and AICTE and UGC. The School also generated funds by teaching courses to students of Sun Chan University, Korea in 2003. From these funds, School enriched its library and further improved infrastructure facility.

The School had provided computational services to the entire university till mid-nineties. Now the school has developed special faculty labs to meet the research needs of individual faculty members. It has laboratories with state-of-art hardware and software facility available 24 hours for the students. Further, the school is in the process of establishing an E-Learning lab that may provide services to the entire university and provide learning opportunities to students from other institutions in the country.

The number of research publications and Ph.D awards has been growing steadily. As an indicator of research activity in the School, the papers published by the faculty and the students during last five years in 105 journals and 136 presented in Conferences which is significantly higher than in the past. However, it can be attributed to considerable increase in faculty and students strength. The number of Ph.D awarded during this period is around 25.

Having adequately developed the courses and facilities in the area of computer science, it is now proposed to pay attention to the development of programmes in Systems Sciences as envisaged in the name of the School viz School of Computer & Systems Sciences. Systems studies could not receive as much emphasis as Computer Science because of the national requirement for the computer professionals and shortage of faculty in Systems Studies. It is proposed to start a new M.Tech programme in Systems Sciences.

Additionally, with a view to enhancing national capability in the area of large-scale data analysis, a new M.Tech course in Statistical Computing has been approved by the University in XIth Plan. Another, new research area, viz Applied Mathematics and Computing is proposed to be developed in the School. To generate qualified manpower for ICT applications in a variety of crucially important sectors like agriculture, health, environment and education, School has also proposed M.Tech in Information Communication Technology (with applications).

In passing it may be mentioned that the School proposed to have greater involvement in National Projects sponsored by various funding agencies. In the end, it may be stated that the success of our projected programmes will critically depend on the availability of faculty of high calibre and suitable experience.

**Evaluative Report of the Department**  
**( 1 April 2012- 31 March 2016)**

1. **Name of the Department** : SCHOOL OF COMPUTER AND SYSTEMS SCIENCES
2. **Year of establishment:** 1975
3. **Is the Department part of a School/Faculty of the University?** : Full-fledged School
4. **Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt.,etc.) :**
  - Master in Computer Applications
  - M.Tech in Computer Science & Technology
  - M.Tech in Statistical Computing: Specialisation in Data Science
  - M.Tech in Statistical Computing: Specialisation in Data Communication
  - M.Phil/Ph.D in Computer Science & Technology
  - Ph.D in Computer Science
5. **Interdisciplinary programmes and departments involved**
6. **Courses in collaboration with other universities, industries, foreign institutions, etc.**
7. **Details of programmes discontinued, if any, with reasons**
8. **Examination System: Annual/Semester/Trimester/Choice Based Credit System:** Semester system
9. **Participation of the department in the courses offered by other departments:** School of Language, Literature & Cultural Studies, JNU

**10. Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/ Asst Professors /others)**

	Sanctioned	Filled	Actual (including CAS & MPS)
<b>Professor</b>	07	02	<b>09</b>
<b>Associate Professors</b>	12	07	<b>01</b>
<b>Asst. Professors</b>	12	10	<b>09</b>
<b>Others (Superannuated &amp; re-employed Professors)</b>	-	-	<b>02</b>

**11. Faculty profile with name, qualification, designation, area of specialisation, experience and research under guidance**

S.NO.	Name	Qualification	Designation	Subject Specialization	No. of Year of Experience	No of Ph.D/ M.Phil students guided for last 4 years
<b>1</b>	Karmeshu	Ph.D	Superannuated and Re-employed Professor	Performance Modelling of Communication Networks. Computational Neuroscience and System Biology. Modelling of	46	

S.NO.	Name	Qualification	Designation	Subject Specialization	No. of Year of Experience	No of Ph.D/ M.Phil students guided for last 4 years
				Socio-Technical Systems. Computational Finance		
2	K.K. Bhardwaj	Ph.D	Superannuated and Re-employed Professor	Machine Learning, Intelligent Systems, Knowledge Discovery and Computational Web Intelligence	45	
3	C.P. Katti	Ph.D	Professor	Numerical Analysis / Scientific Computing, Parallel Processing / Parallel Computing	35	
4	S. Balasundram	Ph.D	Professor	Support vector machine and Extreme learning	31	

S.NO.	Name	Qualification	Designation	Subject Specialization	No. of Year of Experience	No of Ph.D/ M.Phil students guided for last 4 years
				machine methods, Fuzzy Regression, Applied optimisation		
5	Parimala. N	Ph.D	Professor	DBMS, Data Warehousing, Software Engineering, Object Oriented Systems, Service Oriented Architecture	38	
6	Sonajharia Minz	Ph.D	Professor	Data Mining, Machine Learning, Soft Computing, Rough Sets, Geo-Spatial-Informatics	27	
7	Ramesh Kumar Agrawal	Ph.D	Professor	Data Mining, Pattern Recognition, Machine Learning,	25	

S.NO.	Name	Qualification	Designation	Subject Specialization	No. of Year of Experience	No of Ph.D/ M.Phil students guided for last 4 years
				Information Security		
8	Daya Kishan Lobiyal	Ph.D	Professor	Mobile Ad-hoc Networks Natural Language Processing Video on Demand	20	
9	Deo Prakash Vidyarthi	Ph.D	Professor	Parallel/Distributed Systems, Mobile Computing	25	
10	Rajeev Kumar	Ph.D	Professor	Dependable Software System, Evo. Combinatorial Optimisation, Machine Intelligence, Multimedia	31	
11	Satish Chand	Ph.D	Professor	Video Broadcasting, Image Processing,	25	

S.NO.	Name	Qualification	Designation	Subject Specialization	No. of Year of Experience	No of Ph.D/ M.Phil students guided for last 4 years
				Wavelet transforms applications, Digital Watermarking , Steganography, Sensor networks.		
12	T.V. Vijay Kumar	Ph.D	Associate Professor	Databases, Nature Inspired Computing	13	
13	Sushil Kumar	Ph.D	Assistant Professor	Communication Networks and Simulations, Wireless Ad-Hoc and Sensor Networks, Vehicular Ad-Hoc Networks	15	
14	Zahid Raza	Ph.D	Assistant Professor	Parallel and Distributed Systems, Grid	14	

S.NO.	Name	Qualification	Designation	Subject Specialization	No. of Year of Experience	No of Ph.D/ M.Phil students guided for last 4 years
				Computing, Cloud Computing		
15	Aditi Sharan	Ph.D	Assistant Professor	Text Mining, Information Retrieval , Natural Language Processing	16	
16	Tirthankar Gayen	Ph.D	Assistant Professor	Software Engineering, Natural Language Processing, Cloud Computing	10	
17	Poonam Agarwal	Ph.D	Assistant Professor	MEMS, RF MEMS, BioMEMS, Polymer Technologies	04	
18	Ayesha Chaudhary	Ph.D	Assistant Professor	Computer Vision, Machine Learning, Digital Image Processing,	04	

S.NO.	Name	Qualification	Designation	Subject Specialization	No. of Year of Experience	No of Ph.D/ M.Phil students guided for last 4 years
				Linear Algebra, Optimisation		
19	Karan Singh	Ph.D	Assistant Professor	Network Security, Multicast Communication, Computer Networking, Sensor Network	07	
20	Asutosh Srivastava	Ph.D	Assistant Professor	VLSI design, Nano-electronics, CAD tools in VLSI design, Computer Architecture	11	
21	Buddha Singh	Ph.D	Assistant Professor	Mobile Ad Hoc Networks, Wireless Sensor Networks	03	

## 12. List of Senior Visiting Fellows, adjunct faculty, emeritus professors

- Prof.V.V. Menon, IIT, BHU
- Prof. N. Kamboj, IIT, Delhi
- Prof. D. K. Banerjee, Canada
- 

13. **Percentage of classes taken by temporary faculty – programme-wise information**

14. **Programme-wise Student-Teacher Ratio**

MCA : 1:14

M.Tech/Ph.D : 1:7

15. **Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual**

	Sanctioned	Filled	Actual
<b>Technical</b>	17	08	08
<b>Administrative</b>	14	07	07

16. **Research thrust areas as recognised by major funding agencies:**

17. **Number of faculty with ongoing projects from a) National b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.**

Dr. Poonam Agarwal: Rs. 90 Lacs, DST

18. **Inter-institutional collaborative projects and associated grants received**

- National collaboration**
- International collaboration**

19. **Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received.**

20. **Research facility/centre with**

- state recognition
- national recognition
- international recognition

**21. Special research laboratories sponsored by / created by industry or corporate bodies**

**22. Publications: (up to March 2016)**

- \* Number of papers published in peer-reviewed journals (national/international): 198
- \* Monographs
- \* Chapters in Books: 5
- \* Edited Books
- \* Books with ISBN with details of publishers: 01, ISBN-978-1-4666-0203-8, IGI-Global
- \* Number listed in International Database (For *e.g.* Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.)
- \* Citation Index – range/average
- \* SNIP
- \* SJR
- \* Impact Factor – range/average
- \* h-index

**23. Details of patents and income generated** NA

**24. Areas of consultancy and income generated** NA

**25. Faculty selected nationally / internationally to visit other laboratories / institutions/industries in India and abroad**

Dr. Zahid Raza, Asian Institute of Technology, Thailand, 2013

**26. Faculty serving in**

- a. National committees b) International committees c) Editorial Boards d) any other (please specify)  
National Committees:

Prof. Karmeshu, Prof. K.K.Bharadwaj , Prof. C.P.Katti, Prof. Bala Sundaram, Prof. Parimala, Prof. Sonahazaria Minz, Prof. R.K.Agrawal, Prof. D.K.Lobiyal, Prof. D.P.Vidyarthi, Prof. Rajeev Kumar, Prof. Satish Chand, Dr.T.V.Vijay Kumar, Dr. Sushil Kumar, Dr. Zahid Raza, Dr. Tirthankar Gayen, Dr. Poonam Agarwal, Dr. Ayesha Chowdhary, Dr. Karan Singh, Dr. Asutosh Srivastava, Dr. Budha Singh

**27. Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs).**

Dr.T.V.Vijay Kumar, Dr. Sushil Kumar, Dr. Zahid Raza, Dr. Tirthankar Gayen,  
Dr. Poonam Agarwal, Dr. Ayesha Chowdhary, Dr. Karan Singh, Dr. Asutosh Srivastava, Dr. Budha Singh

**28. Student projects**

- percentage of students who have done in-house projects including inter-departmental projects: 100 %
- percentage of students doing projects in collaboration with other universities / industry / institute : 90-100 % (MCA)

**29. Awards/recognitions received at the national and international level by**

- Faculty
- Doctoral/post doctoral fellows
- Students

**30. Seminars/ Conferences/Workshops organized and the source of funding (national/ international) with details of outstanding participants, if any.**

- International research workshop in Cloud Computing (RWCC) – Sep,2014
- International research workshop in Cloud Computing (RWCC) – Dec 2015
- International research workshop in Cloud Computing (RWCC) – Dec 2016
- Python workshop – March 2016
- International Workshop on Big Data & Analytics (WBDA) – March 2016
- International Workshop on Big Data & Analytics (WBDA) – March 2017
- International mini workshop on VLSI Systems, January 2015
- International mini workshop on VLSI Systems, January 2016
- International Conference on Signal, Network, Computing & Systems (ICNCS)

- Feb 2016
- Fuzzy and Rough Set for Knowledge Discovery – September 2016
- Short term course in Network & Cyber Security – July 2016
- GIAN course on “Spatial Data Analytics “ - Dec 2016

31. **Code of ethics for research followed by the departments:**

- A course on “Academic Ethics and Technical Writing” for M.Tech & Ph.D students
- Plagiarism checks are carried out before the submission of Thesis/ Dissertations submitted by the students

32. **Student profile programme-wise:**

Name of the Programme (refer to	Applications received	Selected		Pass percentage	
		Male	Female	Male	Female
MCA	6901	5	1		
MPhil/Mtech/PhD	2977	15	13		
<b>PhD</b>	<b>150</b>	<b>4</b>			

33. **Diversity of students**

Name of the Programme (refer to question no. 4)	% of students from the same university	% of students from other universities within the State	% of students from universities outside the State	% of students from other countries

34. **How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.**

**35. Student progression**

<b>Student progression</b>	<b>Percentage against enrolled</b>
<b>UG to PG</b>	<b>--</b>
<b>PG to M.Phil/M.Tech</b>	<b>5% approx</b>
<b>PG to Ph.D.</b>	<b>90% approx</b>
<b>Ph.D. to Post-Doctoral</b>	<b>--</b>
<b>Employed</b>	
<ul style="list-style-type: none"> <li>• <b>Campus selection</b></li> <li>• <b>Other than campus recruitment</b></li> </ul>	<b>Approx. 95%</b>
<b>Entrepreneurs</b>	

**36. Diversity of staff**

<b>Percentage of faculty who are graduates</b>	
<b>of the same university</b>	<b>33.3%</b>
<b>from other universities within the State</b>	<b>23.8 %</b>
<b>from universities from other States</b>	<b>38.1 %</b>
<b>from universities outside the country</b>	<b>4.8 %</b>

**37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period: 01**

**38. Present details of departmental infrastructural facilities with regard to**

- |   |           |
|---|-----------|
| a. Library : No of books                      | -1929     |
| b. Internet facilities for staff and students | : for all |
| c. Total number of class rooms                | : 04      |
| d. Class rooms with ICT facility              | : 04      |
| e. Students' laboratories                     | : 03      |

f. Research laboratories : 21

**39. List of doctoral, post-doctoral students and Research Associates**

- a. from the host institution/university
- b. from other institutions/universities

**40. Number of post graduate students getting financial assistance from the university.**

**41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.**

- Student consultation in SFC
- Discussion with Industry professionals
- Discussion with other academic professionals
- Discussion in Faculty meeting
- Discussion in Special Committee
- Discussion in Academic Council
- Discussion in Executive Council

**42. Does the department obtain feedback from**

- g. Faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilise the feedback? Yes, Courses restructured
- h. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilise the feedback? Yes, Courses restructured, Courses redesigned, Syllabus modified
- i. Alumni and employers on the programmes offered and how does the department utilise the feedback? Yes, Discourses to students

**43. List the distinguished alumni of the department (maximum 10)**

**44. Give details of student enrichment programmes (special lectures/workshops / seminar) involving external experts.**

Name	Institution
<b>IEEE Student Branch, JNU</b>	
<b>Dr. Ravi Kothari</b>	IBM, New Delhi
<b>Prof. Rahul Garg</b>	IIT Delhi.
<b>Dr. Chandresh Kumar Maurya</b>	Research Scholar at IIT, Roorkee.
<b>Prof. Masahiro Fujita</b>	VLSI Design and Education Center (VDEC), University of Tokyo, JAPAN
<b>Prof. Makoto Ikeda</b>	Department of Electrical Engineering & Information Systems, University of Tokyo, JAPAN
<b>Dr. Ragini Verma</b>	University of Pennsylvania, USA.
<b>Prof. Mohan Kankanhalli</b>	Dean of NUS School of Computing, National University of Singapore, Singapore.
<b>JNU ACM Student Chapter</b>	
<b>Prof. Shashi Shekhar</b>	McKnight Distinguished University Professor, Department of Computer Science College of Science and Engineering, University of Minnesota
<b>Prof. Jayadeva</b>	Microsoft Chair Professor, Department of Electrical Engineering, IIT Delhi
<b>Ms Sandesha Rayapa-Garbiyal</b>	Assistant Professor, Linguistic Empowerment Cell, Jawaharlal Nehru University, New Delhi
<b>Dr. Rajiv Ratan Shah</b>	Research Scholar, National University of Singapore

45. List the teaching methods adopted by the faculty for different programmes.
- Lecturing

- Demonstrating (Examples & Experiments)
- Collaborating
- Classroom discussion
- Debriefing
- Classroom action research

**46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?**

- Review of the Students performance
- Core and Elective courses are offered to the students
- Courses are periodically reviewed
- New courses are added ad per the advancements in the field of Computer and Systems Sciences
- Periodic consultation with the students regarding the programmes, their course Structure, Course syllabus and teaching methods
- Research and other academic achievements are reported in the annual report of the University

**47. Highlight the participation of students and faculty in extension activities.**

- Remedial courses for SC/ST/OBC/Minority students
- Seminars as part of IEEE Student Branch and ACM student chapter
- Providing financial support to students from the University-Corpus fund for paper presentation and participation in conference and workshops
- Providing financial support to Faculty members for paper presentation and participation in conference and workshops

**48. Give details of “beyond syllabus scholarly activities” of the department**

- International research workshop in Cloud Computing (RWCC) – Sep, 2014
- International research workshop in Cloud Computing (RWCC) – Dec 2015
- International research workshop in Cloud Computing (RWCC) – Dec 2016
- Python workshop – March 2016
- International Workshop on Big Data & Analytics (WBDA) – March 2016
- International Workshop on Big Data & Analytics (WBDA) – March 2017
- International mini workshop on VLSI Systems, January 2015
- International mini workshop on VLSI Systems, January 2016
- International Conference on Signal, Network, Computing & Systems (ICNCS)

- Feb 2016
- Fussy and Rough Set for Knowledge Discovery – September 2016
- Short term course in Network & Cyber Security – July 2016
- Annual Technical event “TECHNOPHILIA” including various universities and colleges from within and outside Delhi.
- GIAN course on “Spatial Data Analytics “ - Dec 2016

**49. State whether the programme/department is accredited/ graded by other agencies? If yes, give details.**

**50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.**

The faculty members are carrying out research in the emerging areas in Computer and Systems Sciences and accordingly publishing papers in reputed conferences/journals/transactions etc.

**51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.**

**Strengths :**

- Faculty working in emerging research areas in Computer & Systems Sciences
- Faculty members are in various committees for National/International activities
- Faculty members are invited for keynotes in International conferences/workshops etc.
- Students are well placed in reputed MNC’s

**Weaknesses:** Insufficient lab space for further advancement of the labs

**Opportunities:** Proposing to start dual degree program (B.Tech & M.S) tapping specialisation in other areas in the University

**Challenges:** Getting funds and teaching positions for the current and new programs

**52. Future plans of the department:**

- To start dual degree program (B.Tech & M.S)
- To start research work in Inter-disciplinary research areas
- To involve reputed researchers from abroad for betterment of research

## SCHOOL OF COMPUTATIONAL AND INTEGRATIVE SCIENCES

**The School of Computational and Integrative Sciences** (earlier: School of Information Technology, SIT) was established in the University in 2001, by inclusion of the Centre for Computational Biology and Bio-Informatics, CCBB - previously known as BioInformatics Centre, (BIC), Communication and Information Services (CIS) and the High Performing Computing Center (HPCC - earlier known as computer centre). At the beginning, the focus of the School was on the use of information technology on education and research. Since then the emphasis of the school has grown up to find how the increased availability of information in all spheres of enquiry, be it biological, physical, geological, economics, etc. can be most effectively utilised in an academic context. The Centres (CCBB, CIS & HPCC) were existing as independent bodies in the University prior to the formation of the School, of which Center for Information System has been supporting electronic communication, internet facilities, video meetings, etc. for the whole university as a part of SIT till 2009. Since the beginning, CCBB is supported under Centre of Excellence by DBT and HPCC has been supported by UGC XIth Plan till now.

The major aim of our school is to integrate tools and techniques from different branches of sciences and apply them to find solutions for natural and social sciences. Rapid advancements in science and cutting edge technologies are enabling and driving the research direction in a big way. In our School, new innovative approaches are being tried and tested with active participation of researchers from diverse fields and fast emerging areas which include bioinformatics, computational and systems biology, complex systems studies, high-performance computing, artificial intelligence, computational neuroscience and are increasingly drawing the attention of researchers worldwide. Due to our emphasis in teaching and research programs in areas which are interdisciplinary in nature, in 2010, Academic Council has approved to change our school's name from School of Information Technology to **School of Computational & Integrative Sciences**.

Faculties of the School are drawn from experts in diverse subjects like Biology, Physics, Chemistry, Mathematics, Statistics & Computer Sciences well trained abroad. Our School has a balance proportion of highly acclaimed & established researchers in the field of computational biology, drug designing & complex systems as well as a team of young researchers with proven potential of excellence in diverse field like structural

bioinformatics, high-density data modelling, artificial intelligence, chemical biophysics & evolutionary biology.

Our academic program is currently focused on the core area of Computational and Systems Biology and gradually other areas are given impetus. To meet this objective, SCIS offers M.Tech. and Ph.D. / Pre.Ph.D. program in the broad area of Computational and Systems Biology. To nurture, strengthen and support all academic activities, a core group of faculty/researchers are involved in all aspects of teaching, training and research. Since 2002 Department of Biotechnology (Govt. of India) has identified our school's programme of CCBB as a "Centre of Excellence" in Bioinformatics. Faculty and students are currently pursuing research in diverse fields such as Comparative Genomics, Structural Biology and in silico drug design, Biological Evolution, Biomolecular Simulations, data mining and analysis of large scale data, biophysics, systems biology, robotics, complex systems and artificial intelligence. As a real interdisciplinary school, many faculties are working as collaboration with SLS, SBT, SPS & SCMM at JNU which is reflected in the publication list.

Students coming out of our courses are pursuing research career in esteemed Universities/Institutes in India, USA, Germany, considerable number of M.Tech. also are employed in Industry.

Teaching and research program in these areas need powerful computational and communication infrastructure, and in that direction, a high-performance computing facility and dedicated high-speed connectivity through Garuda, NKN & Enet has been established, supported by UGC XIth Plan.

SCIS has also initiated a program in **Centre for Complex Systems Study (CCSS)** funded by UGC XIth plan which supports research on the complex behaviour in mathematical, physical, living and social systems. This necessitates the setting up of another core group on "computational modeling" which will attempt to develop a simplified description of a system that can be useful for simulation or analysis. New area of research may enable us to identify patterns that underlie the inter-related systems. Properties such as emergence, evolution, network, structure and dynamics of the systems will be investigated in a collaborative environment. Under UGC XIth Plan the School will be recruiting 5 exclusive faculties for this programme.

Our courses in M.Tech. & Pre-Ph.D. requires regular evaluation by the Special Committee of School and syllabus is revised twice since the start, 2006. The introduction to new topics and credit distribution for project & paper presentation along with classroom teaching are part of such revision.

Our faculties are involved in contributing collaborative research nationally and international level. DBT, DST & MCIT projects which enable them to continue international level research activities successfully. Two of our faculties have involved in international projects “Global Infectious Diseases” Seattle Biomedical Research Institute (<http://www.seattle-india-gid.org/home/index.asp>) funded by NIH, USA and “Open Tox – An Open Source Predictive Toxicology Framework” ([www.opentox.org](http://www.opentox.org)) funded by E.C., Europe Grants.

One faculty is involved in OSDD projects in India. We have seven DBT, two DIT, two CSIR, one DST, one European Commission and one Ranbaxy funding at our School in addition to UGC funding. Some of our faculties are in the Task Force Members of DBT-BCSB (Bioinformatics), DIT (Bioinformatics) and ICMR (Medical Informatics). One adjunct faculty is presently Vice-Chancellor of Hyderabad University, and another is INSA’s Vice-President.

Since 2006, 12 Ph.D. are completed and 25 are presently pursuing research. We exchanged two Ph.D. students with Queensland University, Australia and Bioinformatics Institute, Singapore to mention a few successful endeavour of our School. Last five years the School has trained almost 50 project trainee in Bioinformatics research area, some of them contributed to publication and developing Software and Data Base. Under CCBB we host several in-house developed Software and Data Base for usage in Bioinformatics community <http://ccbb.jnu.ac.in/>. Some of them have been transferred to industry through collaboration, more to follow.

The novelty of our School is to provide support and technical competency for continuing cutting edge research in Interdisciplinary Science which also reflected in our publication list.

**Evaluative Report of the Department**  
**( 1 April 2012- 31 March 2016)**

- 1. Name of the Department**  
*School of Computational and Integrative Sciences*
- 2. Year of establishment**  
*2000*
- 3. Is the Department part of a School/Faculty of the university?**  
*School*
- 4. Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt., etc.)**  
*PG-Diploma in Bioinformatics (2001-2006)*  
*M.Tech (Computational and Systems Biology) – 2006-2016*  
*PhD (Direct)– Computational Biology (2002 to date)*  
*Pre-PhD – Computational Biology (2009 to date)*  
*Integrated MSc-PhD in Computational and Integrative Sciences (2015-2017)*  
*MSc (Computational and Integrative Sciences) – 2017 onward*  
*PG-Diploma in Biological Big Data Analytics – 2017 onward*
- 5. Interdisciplinary programmes and departments involved**  
*The school was established as an interdisciplinary program and has concurrent faculty from the Schools of Life Sciences, Physical Sciences and Computer and Systems Sciences.*
- 6. Courses in collaboration with other universities, industries, foreign institutions, etc.**  
*MOU and Student exchange program with*
  - a) Bioinformatics Institute (BII) Singapore*
  - b) Centralespulec, France*
  - c) Graduate School of Information Science and Technology, Hokkado University, Japan*
  - d) University of Queensland, Australia*
  - e) University of Padova, Italy*
  - f) National Institute of Chemical Physics and Biophysics, Estonia*
- 7. Details of programmes discontinued, if any, with reasons**  
*PG-Diploma in Bioinformatics (2001-2006) – replaced with M.Tech*  
*M.Tech (Computational and Systems Biology) – 2006-2016 – replaced with*

*Integrated MSc-PhD program*

*Integrated MSc-PhD in Computational and Integrative Sciences (2015-2017) –  
reverted to an MSc due to compliance with UGC-regulations for PhD program*

**8. Examination System: Annual/Semester/Trimester/Choice Based Credit System**

*Semester Based Credit System*

**9. Participation of the department in the courses offered by other departments**

*Conducts Bioinformatics courses at Special Center for Molecular Medicine*

**10. Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/Asst. Professors/others)**

Actual (including CAS & MPS)	Filled	Sanctioned	
05	03	06	Professor
05	04	11	Associate Professors
03	03	05	Asst. Professors
01	01	--	Others (UGC recharge)

**11. Faculty profile with name, qualification, designation, area of specialization, experience and research under guidance**

No. of Ph.D./ M.Phil. students guided for the last 4 years	No. of Years of Experi ence	Specialization	Designa tion	Qualificatio n	Name
--	---	----------------	-----------------	-------------------	------

No. of Ph.D./ M.Phil. students guided for the last 4 years	No. of Years of Experience	Specialization	Designation	Qualification	Name
	34		Professor	Ph.D	<b>Indira Ghosh</b>
	03		Professor	Ph.D	<b>Anirban Chakraborti</b>
6 (completed) 4(current) PhD/ 11(completed) MTech	19	Structural Biology, Bioinformatics and Computational Biology, Cyberinfrastructure	Professor	Ph.D	<b>Andrew M. Lynn</b>
	17		Professor	Ph.D	<b>Pradipta Bandyopadhyay</b>
-	22		Professor	Ph.D	<b>Shandar Ahmad</b>
1 PhD/2 MTech	15	Statistical learning	Associate Professor	Ph.D	<b>Narinder S. Sahni</b>
	28	Bioinformatics, chemoinformatics	Associate Professor	Ph.D	<b>N.S. Rao</b>
Ph.D. - 4 (one awarded, one submitted, two pursuing)	10	Plant Genomics, Bioinformatics and Biotechnology	Associate Professor	Ph.D	<b>Mukesh Jain</b>
	06 months	Mathematical biology	Associate Professor	Ph.D	<b>Sapna Ratan Shah</b>
	13	non-linear dynamics and complex networks	Associate Professor	Ph.D	<b>R.K.Brojen Singh</b>
M.Tech - 8 Ph.D - 1 (submitted)	11	Computational biology	Assistant Professor	Ph.D	<b>A.Krishna machari</b>
	04	Graph Theory and Graph Theory	Assistant Professor	Ph.D	<b>Gajendra P. Singh</b>
(02 pursuing)	06	Biomolecular simulation and	Assistant Professor	Ph.D	<b>Arnab Bhattachar</b>

No. of Ph.D./ M.Phil. students guided for the last 4 years	No. of Years of Experience	Specialization	Designation	Qualification	Name
		dynamics			jee
	08 years	Grass Genetics and Informatics	Assistant Professor	Ph.D	Rita Sharma

**12. List of Senior Visiting Fellows, adjunct faculty, emeritus professors**

- i) *Prof. Alok Bhattacharya*
- ii) *Prof. R.Ramaswamy*
- iii) *Prof. R.N.K.Bamezai*
- iv) *Prof. Karmeshu*
- v) *Dr. Devapriya Choudhury*

**13. Percentage of classes taken by temporary faculty – programme-wise information**

*MSc - 8%*  
*MTech - 0%*  
*PhD - 0%*

**14. Programme-wise Student-Teacher Ratio**

*Ph.D = 3:1*  
*M.Sc = 1.5:1*  
*M.Tech = 2:1*

**15. Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual**

Actual*	Filled	Sanctioned	
9	6	6	Technical
9	6	6	Administrative

*\* Additional staff are employed as technical or multi-purpose staff from manpower head of departmental grants*

**16. Research thrust areas as recognized by major funding agencies**



*COE- DBT (Department of Biotechnology, Center of Excellence)*

## **20. Research facility/centre with**

### **National recognition:**

*Centre of Excellence in Bioinformatics, recognised by Department of Biotechnology, Govt. of India*

### **International recognition:**

*Bioinformatics Institute (BII) Singapore*

*Centralespulec, France*

*Graduate School of Information Science and Technology, Hokkaido University, Japan*

*University of Queensland, Australia*

*University of Padova, Italy*

*National Institute of Chemical Physics and Biophysics, Estonia*

## **21. Special research laboratories sponsored by / created by industry or corporate bodies**

*High-Performance Computational Facility, was established by the Center for Development of Advanced Computing (CDAC), Pune.*

## **22. Publications:**

- Number of papers published in peer-reviewed journals (national/international) *196 papers (2012-16)*
- Monographs
- Chapters in Books: *21 (2012-16)*
- Edited Books
- Books with ISBN with details of publishers
- Number listed in International Database (For e.g. Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.)**
- Citation Index – range/average**
- SNIP**

- SJR
- Impact Factor – range/average
- h-index

**23. Details of patents and income generated**

**24. Areas of consultancy and income generated**

*Prof. Anirban Chakraborti with TCS, Gurgaon*  
*Dr. Narinder S. Sahni with Lipomic Healthcare, New Delhi*  
*Dr. Lovekesh Vig with TCS, Gurgaon*  
*Dr. Lovekesh Vig with InfoEdge India Ltd., Noida (for 2 months)*  
*Dr. Arnab Bhattacharjee*

**25. Faculty selected nationally / internationally to visit other laboratories / institutions**

1. *UCSD - Dr. Brojen Singh*
2. *Toyo University , Japan - Prof. Anirban Chakraborty*
3. *University of Padova, Italy - Prof. Anirban Chakraborty*
4. *Centralespulec, France - Prof. Anirban Chakraborty*
5. *Graduate School of Information Science and Technology, Hokkado University, Japan*  
     - *Prof. Anirban Chakraborty*
6. *National Institute of Chemical Physics and Biophysics, Estonia - Prof. Indira Ghosh*

/ industries in India and abroad

**26. Faculty serving in**

- a) National committees b) International committees c) Editorial Boards d) any other (please specify)

***Andrew M. Lynn***

- *Board of Studies, Bioinformatics, Banasthali Vidyapeeth, Rajasthan, India*
- *Committee of Courses, Bioinformatics, Pondicherry University*
- *Committee of Courses, MMV, Banaras Hindu University,*
- *Board of Studies, Bioinformatics, Central University of Bihar, India*
- *PRSG for “NRCFOSS Phase II”, Ministry of Communication and Information Technology*
- *Budget Committee: Open Source Drug Discovery Consortium, CSIR, India*

- *Technical Committee: Open Source Drug Discovery Consortium, CSIR, India*

***Brojen Singh***

- *Visiting Researcher's Fellowship awarded by University of Sydney*

***Indira Ghosh***

- *Chairman of PRSG board at DEITY, Ministry of Communication and Information Technology.*
- *Member of Task force of Bioinformatics ... at DBT*
- *Member of the task force of ICMR Medical Informatics.*
- *Expert member of CUHP Board on Life Science*
- *Expert Member in Pondicherry Central University Board on Life Science*

***Arnab Bhattacharya***

- *Examiner of a PhD comprehensive test of a student at IIT Delhi.*
- *Member of the review committee for a couple of PhD students at IIT Delhi.*

***Mukesh Jain***

- *Jury member, INSPIRE National Level Exhibition & Project Competition 2013-2016, New Delhi.*
- *External Expert Member, Board of Studies, Amity Institute of Biotechnology, Amity University Rajasthan, Jaipur (2017 onwards).*
- *External Expert Member, Board of Studies, Bioinformatics, Mahila Maha Vidyalaya, Banaras Hindu University (2016-2018).*
- *Member, Academic Review Committee, Indian Institute of Technology (IIT), Jodhpur (2016).*
- *Member, Expert Committee of Innovative Young Biotechnologists Award, Department of Biotechnology, Government of India (2016-2019).*
- *External Expert Member, Selection committee for project fellows/post-doctoral fellows at the GGS Indraprastha University, New Delhi*
- *Editorial board member, Nature Scientific Reports, Frontiers in Plant*

- Science, PLoS ONE, Molecular Breeding and BMC Research Notes*
- *Member American Society for Plant Biologists, Society of Experimental Biology.*

***Rita Sharma***

- *Lifetime membership, Indian Society for Plant Physiology*

***Gajendra Pratap Singh***

- *Indian Society of Industrial and Applied Mathematics (ISIAM), receipt no. 224, dated 29-January-2016.*

*Appointed as Observer for UGC NET EXAM-July 10, 2016.*

*Act as Observer with reference letter no. CBSE-UGC (NET)/2015/D151084/64 dated November 11, 2015 for UGC NET Exam-Dec 27, 2015, conduct by Central Board of Secondary Education, Noida, Distt. Gautam Budh Nagar, U.P., India*

***Shandar Ahmad***

- *Visiting Scientist, National Institute of Biomedical Innovation, Health and Nutrition (NIBIOHN), Japan*

**27. Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs).**

*Dr. Rita Sharma completed the UGC sponsored Orientation course organised by Human Resource Development Centre, JNU during 8th February 2016 to 4th March 2016 with Grade A.*

*Dr. Gajendra Pratap Singh completed four weeks Orientation course organised by Human Research Development centre, JNU during 3-10-2016 to 28-10-2016 with Grade 'A'.*

*Dr. Gajendra Pratap Singh completed four weeks first refresher course in Research Methodology organised by Human Research Development Centre, JNU during 13-2-2017 to 10-03-2017 with Grade 'A'.*

## 28. Student projects

- percentage of students who have done in-house projects including inter-departmental projects
- 100%
- percentage of students doing projects in collaboration with other universities / industry / institute

## 29. Awards/recognitions received at the national and international level by

- Faculty

*Prof. Pradipta Bandyopadhyay got the Distinguished Lecturership Award from Chemical Society of Japan, 2013.*

*Dr. Lovekesh Vig got the DST Young Scientist Award for project "Automaticity in Robot Motor Skill Learning", 2013-15*

*Dr. Brojen Singh Awarded Raman Fellowship by UGC for advanced research in USA.*

*Dr. Mukesh Jain elected Fellow of National Academy of Agricultural Sciences (NAAS), New Delhi (2016).*

*Dr. Mukesh Jain elected Fellow of National Academy of Sciences India (NASI), Allahabad (2015).*

*Dr. Rita Sharma got the Ramalingaswami Re-entry Fellowship (Continuing from March 2014).*

- Doctoral/post doctoral fellows
- One National Board of Higher Mathematics research fellow Dr. Sangeeta Chaudhary is working under Dr Gajendra Pratap Singh from March 1, 2016, to till date.*
- Dr. Himanshi Bhatia, National Post-Doctoral Fellow, DST-SERB, under the supervision of Dr. Mukesh Jain (July 2016 onwards)*

## 30. Seminars/ Conferences/Workshops organised and the source of funding (national/ international) with details of outstanding participants, if any.

*Symposium on "Biomolecules in Motion: Theory and Simulations" January 4-6 2013 organised by Prof. Indira Ghosh.*

*Symposium on Synthetic Biology - building the foundations of biological engineering in India, at JNU on 21<sup>st</sup> December 2012.*

*One day workshop on "Latest Advances in Computational Drug Discovery" in October 29, 2012, organized by Prof. Indira Ghosh.*

*N ational Conference-cum-Workshop on "Search for Antimalarials:Mechanism Based Approach" , 27th - 29th April 2012 organised by Prof. Indira Ghosh.*

*Symposium on “Complex Systems: from Physics to Biology”, October 15-16, 2013, organised by Dr. A.Krishnamachari.*

*Workshop on “Computational Core for Plant Metabolomics”, 20 November 2013, organised by Prof. Indira Ghosh.*

*Satellite workshop on “Advances in Molecular Dynamics of Biomolecules”, December 3-4, 2013 organised by Prof. Indira Ghosh.*

*Indo-US Conference and Workshop on Synthetic and Systems Biology, November 9-12, 2014 organised by Prof. Indira Ghosh.*

*Indo-US Bilateral Conference-cum-Workshop Big Data Analysis and Translation in Disease Biology (Big Data and Disease), January 18-22, 2015 organised by Prof. Indira Ghosh.*

*Statphys – Kolkata VIII, 1-5 December, 2014, convened by Prof. Anirban Chakraborti.*

*Mini-Symposium on Complex Systems, February 2, 2015 organised Prof. Anirban Chakraborti.*

*The School of Computational and Integrative Sciences, JNU had organised International Workshop on “Econophysics & Sociophysics” from 27th November 2015 to 1<sup>st</sup> December 2015 jointly with Delhi University, Boston University, Kyoto University, Ecole Centrale Paris & SINP. Prof. Anirban Chakraborti has organised this conference. Funded by Ecole Centrale Paris.*

*Open Day of the School of Computational and Integrative Sciences had been celebrated on 17<sup>th</sup> February 2016, organised by Dr. A.Krishnamachari, SCIS/JNU. Funded by DBT/CoE.*

*National Symposium on Recent trends in Computational biology” to commemorate silver jubilee year of Bioinformatics centre was held on 1-2 March 2016. Prof. Indira Ghosh and Dr. A.Krishnamachari has organised this symposium. Funded by DBT/CoE.*

*The School of Computational and Integrative Sciences and School of Biotechnology, JNU had jointly organised an International Conference/ Workshop on “Nano-BioInterface - 2016” during 18-20 March 2016. Prof. Anirban Chakraborti, SCIS and Dr. Jayadeep Bhattacharya, SBT have organised this conference. Funded by ICMR, SERB, DBT, etc.*

*Dr. Gajendra Pratap Singh organised International Conference on “Current Trends in Graph Theory and Computation”, organised at South Asian University, New Delhi, India, during September 17-19, 2016 funded by SAARC country.*

**31. Code of ethics for research followed by the departments**

*The University has established an Institutional Research Ethics Board. Research projects are approved by the board following standard practices*

**32. Student profile programme-wise:**

Pass percentage		Selected		Applications received	Name of the Programme (refer to question no. 4)
Female	Male	Female	Male		
		19	95	965	M.Tech
		08	12	243	Ph.D (Direct)
		15	33	149	Pre. Ph.D
		10	16	346	M.Sc-Ph.D (CISM) (2015-2017)

**33. Diversity of students**

% of students from other countries	% of students from universities outside the State	% of students from other universities within the State	% of students from the same university	Name of the Programme (refer to question no. 4)

				M.Tech (2006-2016)
				Ph.D (Direct) (2002 to date)
				Pre. Ph.D (2009 to date)
				M.Sc-Ph.D (CISM) (2015-2017)

**34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.**

Civil Services - 2

NET/DBT/BINC/ICMR - 12

**35. Student progression**

Percentage against enrolled	Student progression
N/A	UG to PG
N/A	PG to M.Phil.
42	PG to Ph.D.
67	Ph.D. to Post-Doctoral
100 0 100	Employed Campus selection Other than campus recruitment
2.5	Entrepreneurs

**36. Diversity of staff**

Percentage of faculty who are graduates*	
07.2	of the same university

21.3	from other universities within the State
57.2	from universities from other States
14.3	from universities outside the country

\* any degree, including PhD

**37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period**

*Nil. All faculty are Ph.D degree awardees*

**38. Present details of departmental infrastructural facilities with regard to**

a) Library

*The school has a departmental library with domain specific textbooks and reference books.*

b) Internet facilities for staff and students

*Every student is provided with a computer, with high-speed internet (100 MBps) and intranet connectivity to servers and storage at 1 GBps. The entire department has high-speed additional wifi connectivity.*

- c) Total number of classrooms *Three*  
d) Classrooms with ICT facility *Three*  
e) Students' laboratories *Four:*  
f) Research laboratories *Two*

**39. List of doctoral, post-doctoral students and Research Associates**

a) *from the host institution/university- 24*

b) *from other institutions/universities -40*

**40. Number of post graduate students getting financial assistance from the university.**

*M.Sc (1st Year)- 16 Students @Rs.5000/- from DBT-CoE*

*M.Sc (2nd Year)- 06 Students @Rs.5000/- from DBT-CoE*

*Ph.D (Non-NET)- 11 Students @Rs.8000/- from UGC-NON-NET*

**41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.**

*The faculty and Board of Studies have sufficient expertise to develop new programmes. They are started either in response to the ability to utilise existing faculty skills or employment opportunities for skills imparted by such a program such as data science. Expert committee review followed by approval through the university structures such as the Board of Studies, Academic Council and Executive Council are some structures.*

**42. Does the department obtain feedback from**

- a. Faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilise the feedback?

*The faculty review the curriculum during the semester and make modifications relevant to integrating the syllabus of different subjects to allow for prerequisites and updating content. Additionally, the end of the semester review of learning outcomes is used to reorganise the program. All modifications are finally approved by the Special Committee (Board of Studies)*

- b. students on staff, curriculum and teaching-learning-evaluation and how does the department utilise the feedback?

*The students-faculty-committee (SFC) reviews the curriculum and evaluates learning outcomes. Additionally, recommendations are forwarded to faculty for implementation through the Special Committee (Board of Studies)*

- c. alumni and employers on the programmes offered and how does the department utilise the feedback?

*Alumni, especially those who pursue higher degrees outside the university, and are presently employed with data analytical companies are sought for their advice on improving the curriculum. The last exercise was conducted in December 2015. Recommendations are used to modify courses.*

**43. List the distinguished alumni of the department (maximum 10)**

*N/A. The School has been running academic programs for only 15 years, and all alumni are at early stages of their careers*

**44. Give details of student enrichment programmes (special lectures / workshops / seminar) involving external experts.**

*The school has a seminar series, and runs workshops as part of the mandate of the externally funded Bioinformatics Center.*

**45. List the teaching methods adopted by the faculty for different programmes.**

*Lectures and Demonstrations*

*Practicals*

*Group projects using standard protocols*

*Individual research projects*

**46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?**

*The faculty and the students-faculty-committee (SFC) review the curriculum during the semester. Additionally, the end of the semester review of learning outcomes is used to reorganise the program. All modifications are finally approved by the Special Committee (Board of Studies)*

**47. Highlight the participation of students and faculty in extension activities.**

*Faculty regularly deliver invited lectures outside the university. The school organises an open day, once a year, to expose the potential of its teaching and research programs to potential students from other universities*

**48. Give details of “beyond syllabus scholarly activities” of the department.**

*The SCIS has depth in mathematical modelling and computer simulation, and these areas are applied in multiple areas focussed on research problems in applied mathematics, computational chemistry, data mining and computational biology/bioinformatics. The syllabus has been designed to focus on data analysis agnostic of discipline and applied in areas as diverse as International Trade, Economics and Geography.*

**49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.**

*The school's bioinformatics and computational biology course is the flagship programme of the Department of Biotechnology's Bioinformatics division. All programmes are accredited by UGC*

**50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.**

*The School has been a nodal center for the university and surrounding institutes in Bioinformatics and Computational Biology since its inception. Key research outputs that are highly cited include the development of novel techniques for gene identification and ligand binding free energy estimation.*

**51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.**

*Strengths*

- 1. Multidisciplinary*
- 2. Focus on Mathematical Modeling and Computer Simulation. Houses the University high-performance computer facilities.*
- 3. National/Internationally recognised skill sets in Computational Biology and Molecular Modelling*
- 4. Unique areas of research such as Econophysics*
- 5. Imparts independent domain skills in data analytics*

*Weaknesses*

- 1. Faculty appointment structure is not amenable to attracting skills in short half-life areas such as computer programming. A temporary solution to this problem is to involve collaborators from industry and other institutions*
- 2. Built-up space is a constraint in housing laboratories and expanding into newer areas*
- 3. The interdisciplinary nature of the student intake has resulted in the requirement for a number of bridge courses required for standardising skills across disciplines at the expense of depth*
- 4. Faculty strength is too low to expand into the multiple disciplines required for a comprehensive coverage of the basic sciences required*
- 5. The research focus has resulted in a blinkered approach to career choices only within Academia among students*

*Opportunities*

- 1. The school is now utilising its skills to add data science as a discipline*
- 2. Entrepreneurship and Industry collaborations are a new area of expansion of present activities*
- 3. Data-driven applications across multiple disciplines is an opportunity to*

*showcase the school's skills even within the university*

- 4. The School has nurtured skills that can contribute to the Govt. of India's "Digital India" program*
- 5. Areas involving the predictive sciences such as big-data analytics, cyber-physical systems and supercomputing missions are easily housed within the skills of our present research areas*

#### **Challenges**

- 1. Look at alternatives for funding to increase floor space and infrastructure required for the School's programs*
- 2. The school works with areas with a short half-life, and being able to restructure programs to avoid redundancy is critical*
- 3. Increasing faculty strength to cover missing skills such as software and data carpentry*
- 4. Build an adequate network with industry*
- 5. Incubate innovative ideas and provide an incubator for early translation.*

#### **52. Future plans of the department.**

*Over the last few years, the use of computational methods has become integral in the Life Sciences, both to predict properties which are subsequently validated experimentally, and to analyse high-throughput data generated from experiments. After a period of focusing resources within the school, it is now time to expand this facility to include faculty from other science Schools/Centers in order to provide a broader network involving both experimental and data analytical solutions.*

*Complex systems - especially network theory - has also become an integral area of application in areas such as economics, sociology, environment and geography. The "integrative sciences" aspect of the school will be more with joint collaborations between the school and other centers where these topics are practiced.*

*Infrastructure: The School building has a foundation which can support an additional three floors, with ~60,000 sq foot area. This space will be useful in establishing a data-center and laboratories which are required by the school for its own programs. In addition, the extra space may be used by joint programs with other schools and an incubator to encourage translational research amongst the present faculty and students. While the school has already established expertise in high-performance computing, topics such as technology-based learning, design and fabrication using 3-D printing, machine translation with crowd-sourcing, etc. can be easily established.*

*The school remains focused on core areas of modelling and simulation, with a strong base in theory and computational applications, and would also be glad to shoulder the responsibility to implement any community-based initiatives such as digital literacy and other issues that may be decided by the university administration from time-to-time.*

## EVALUATIVE REPORT OF SCHOOL OF PHYSICAL SCIENCES

School of Physical Sciences is one of the leading places within India for teaching and research in Physical Sciences. Presently the School offers Ph.D. programs in Physics, Chemistry and Mathematics and a Master's program in Physics. Taught by a highly qualified faculty, all of whom hold Ph.D. degree from leading institutions in India and abroad, our students have found further professional opportunities after graduation with great ease. Reflecting the research orientation of the department most of our Master's students go on to join Ph.D. program after graduation. Graduates with Ph.D. degree usually go for a post-doctoral stint before taking up teaching and/or research positions. So far the School has graduated about 75 Ph.D. students in its twenty-five years of existence. The M.Sc. (Physics) Program, which started in 1992, has graduated about 250 students. Ph.D. programs in Physics, Chemistry and Mathematics started in 1987, 2007 and 2010, respectively.

Faculty of the School has distinguished themselves within the academic community.

Six of the members are fellows of various national academies of science and engineering, and three are S. S. Bhatnagar prize winners. There are several young scientist awardees of the academies. Faculty members are invited frequently to speak or participate in academic events outside

The School has state-of-the-art computing facilities including two independent computing clusters for parallel computing. The larger of these has 256 computing cores. The research areas of the School are: Chemical Physics, Inorganic, Organic and

Physical Chemistry, Computational Physics, Condensed Matter Physics, Disordered systems, Granular materials, Mathematical Physics, Non-equilibrium statistical physics, Nonlinear dynamics, Probability measure, Quantum chaos, Statistical Nuclear Physics, Quantum Optics, String Theory, Complex fluids, Supramolecular Chemistry, Nano-Chemistry, Materials Science, Superconductivity, Magnetism, Nonlinear Optics, Semiconductors, Polymers, Nanoparticle Physics and Ultrafast photophysical processes in Bio and Nanomaterials. There are well-equipped laboratories for doing experimental research in the areas of interest. Faculty also conducts plenty of collaborative research, both within India and abroad, whenever required or opportunities arise. Research papers are published in highly cited journals appearing in the Science Citation Index.

UGC recognised the research work done in SPS by granting it the DRS (Phase I) status in 1994. Upgradation to DRS (Phase II) in 1999 and DRS (Phase III) in 2004 followed. UGC-COSIST scheme was operational for the period 2000-2004. Starting 2009 the UGC support has continued in the form of DSA (Phase I). SPS has also received major funding from the DST in the form of the FIST project in 2002 and 2007. Individual faculty members of SPS have attracted funding from CSIR, UGC, DBT, DST, DAE, etc.

Teaching receives major importance within the School. The syllabi as well as the teaching methodologies compare favourably with the best around the world and are always kept up to date with the best practices being incorporated into our curriculum continuously. All students are initiated into research through active participation in the seminar program of the School where several dozen researchers from India and abroad present the results of their work every year. They also participate in the annual research conference of the School. Master's degree students also have to do mandatory project work.

In the coming years, we plan to develop our programs in Chemistry and Mathematics more fully and start Master's programs in these areas. Also, we plan to cover many other areas of Physics which are presently missing from the School's portfolio.

**Evaluative Report of the Department**  
**( 1 April 2012- 31 March 2016)**

1. **Name of the Department:** School of Physical Sciences

2. **Year of establishment:** 1986

3. **Is the Department part of a School/Faculty of the university?**

School of Physical Sciences currently comprises of physics, chemistry and mathematics programs.

4. **Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt.,etc.)**

Level of the Programme	Number of existing Programmes
PhD	03 (Physics, Chemistry, Mathematics)
PG	01 (Physics)
<b>Total</b>	<b>04</b>

5. **Interdisciplinary programmes and departments involved**

Several faculty members of the school have collaboration with School of Life Sciences, Bioinformatics, Biophysics and Special Center for nano-sciences.

6. **Courses in collaboration with other universities, industries, foreign institutions,etc.**

Several MOUs have been attained with foreign universities, but common courses are yet to be floated. The graduate programs at RRI, IUCAA, and IUAC are mandated through SPS.

7. **Details of programmes discontinued, if any, with reasons**

NA

8. **Examination System: Annual/Semester/Trimester/Choice Based Credit System**

Semester

9. Participation of the department in the courses offered by other departments  
NA

10. Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/Asst. Professors/others) (Information may be gotten from the Academic / Recruitment Branch)

	Sanctioned	Filled	Actual (including CAS & MPS)
Professor	11	8	14
Associate Professors	17	11	5
Asst. Professors	18	11	11
Others	46	30	30

11. Faculty profile with name, qualification, designation, area of specialisation, experience and research under guidance

S. No	Name	Designation	Qualification	Specialization	No. of Years of Experience	No. of Ph.D./ M.Phil. Students guided for the last 4
1	Himadri B. Bohidar	Professor	PhD	Biophysics	35	7
2	Akhilesh Pandey	Professor	PhD	Ranto Matrix Theory	39	3
3	Sanjay Puri	Professor	PhD	Non-equilibrium statistical mechanics	35	4
4	Ram Ramaswamy	Professor	PhD	Nonlinear Science, Systems and		6
5	Shankar Das	Professor	PhD	Statistical mechanics, Density Functional	31	4
6	Rupamanjari Ghosh	Professor	PhD	Experimental and Theoretical Quantum	30	1
7	S. S. N. Murthy	Professor	PhD	Glassy dynamics, Dielectric studies		4

S · N o	Name	Designation	Qualification	Specialization	No. of Years of Experience	No. of Ph.D./ M.Phil. Students guided for the last 4
8	Prasenjit Sen	Professor	PhD	Condensed Matter Physics	32	2
9	Subhasis Ghosh	Professor	PhD	Organic Semiconductors	25	5
10	S. Patnaik	Professor	PhD	Experimental Condensed Matter	17	7
11	Debashis Ghoshal	Professor	PhD	String theory, Quantum field theory.	24	2
12	Riddhi Shah	Professor	PhD	Dynamics of Group Actions	26	3
13	Aranya Bhuti Bhattacharjee	Associate Professor	PhD	Quantum optics, Bose Einstein		2
14	Vijay Madhukar Patankar	Associate Professor	PhD	Number Theory, Crpytography.	12	1
15	Kedar Singh	Associate Professor	PhD	Experimental Condensed Matter	14	4
16	Pritam Mukhopadhyay	Associate Professor	PhD	Organic, Inorganic and Organometallic	14	7
17	<a href="#">Brijesh Kumar</a>	Associate Professor	PhD	Theoretical Condensed Matter	14	4
18	<a href="#">Sobhan Sen</a>	Associate Professor	PhD	Ultrafast Laser Spectroscopy. Single	14	5
19	Poonam Mehta	Assistant Professor	PhD	Theoretical High Energy Physics	13	1
20	Amala Bhawe	Assistant Professor	PhD	Number theory	09	1
21	Manoj Verma	Assistant Professor	PhD	Analytic number theory	04	1
22	Manoj Munde	Assistant Professor	PhD	Biophysical Chemistry.	11	2
23	Tanuja Mohanty	Assistant Professor	PhD	Experimental Condensed Matter	18	5
24	Ankita Rai	Assistant Professor	PhD	Synthetic Organic Chemistry	08	3
25	Rabinra Nath Mahato	Assistant Professor	PhD	Experimental Condensed Matter	06	2
26	Ashim Kr. Pramanik	Assistant Professor	PhD	experimental condensed matter	09	5

S · N o	Name	Designation	Qualification	Specialization	No. of Years of Experience	No. of Ph.D./ M.Phil. Students guided for the last 4
27	Supriya Sabbani	Assistant Professor	PhD	Metal organic coordination	10	2
28	Dinabandhu Das	Assistant Professor	PhD	Polymorphism & Co-crystals Host-guest	11	2
29	Pijus Kumar Sasmal	Assistant Professor	PhD	Inorganic Chemistry, Metal-Catalyzed	07	2

**12. List of senior Visiting Fellows, adjunct faculty, emeritus professors**

	Emeritus professors	Adjunct Faculty	Visiting Fellows
1	Prof. R. Rajaraman		

- 13. Percentage of classes taken by temporary faculty – programme-wise information**  
In Physics one faculty, recruited under leave vacancy, has been teaching one course per semester for last one and half year.
- 14. Programme-wise Student Teacher Ratio**  
Physics (M.Sc + Ph.D) current batch is (30 + 75) and teaching faculty strength is 15.
- 15. Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual: ( Number may be gotten from Academic Branch)**
- 16. Research thrust areas as recognised by major funding agencies**  
Condensed Matter Physics (Theory and Experiments), Number theory (Mathematics), Supra-molecular chemistry and Ultrafast Spectroscopy ( Chemistry)
- 17. Number of faculty with ongoing projects from a) National b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.**

Nature of the Project	Duration Year	Name of the funding Agency	Total grant Sanctioned (Lacs)	Received
<b>Major projects</b>	2013-18 (01)	DST-FIST (01)	750	Continue receiving
	2015-18 (03) 2013-18 (02) 2015-19 (01) 2015-20 (02) 2014-18 (01) 2010-15 (01)	DST  Total: 10	568.42	Continue receiving
	2015-20 (01)	UGC-SAP  Total:01	195	Continue receiving
	2014-19 (01)	UGC Indo-Israel  Total (01)	47.95	
	<b>Minor Projects</b>	2015-17 (02)	UGC  Total: 04	17.60

Nature of the Project	Duration Year	Name of the funding Agency	Total grant Sanctioned (Lacs)	Received
	2015-16 (02)			
	2015-17 (02)	NBHM DAE Total: 02	16.50	Continue receiving
	2015-18	Indo-French (TDB- CEFIPRA- Bpifrance Programme) Total: 01	19.98	Continue receiving
<b>Interdisciplinary Projects</b>	Total: 04			
<b>Industry sponsored</b>				
<b>Projects sponsored by the University/ College</b>				
<b>Students research projects (other than compulsory by the University)</b>				
<b>Any other(Specify)</b>				
<b>Total</b>	<b>15</b>		<b>1609.14</b>	

18. Inter-institutional collaborative projects and associated grants received



1. H. B. Bohidar, Fundamentals of Polymer Physics and Molecular Biophysics, Cambridge University Press, UK, 2014 (ISBN 1107058708 and 9781107058705)
2. H. B. Bohidar (with Kamala Rawat), Design of Nanostructures: Self-assembly of Nanomaterials Wiley-VCH, Germany, 2016 (ISBN 9783527343331)

\* Number listed in International Database (For *e.g.* Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.) 276

\* Citation Index – range/average

**Range: 0.150-11.996**

**Average: 2.64**

\* SNIP

\* SJR

\* Impact Factor – range/average

\* h-index: Average of h-indices of faculty members = **13.24**

### **23. Details of patents and income generated**

1. Un-functionalized Carbon Nanoparticles having Fluorescence Characteristics, Method of Preparation Thereof, and their Use as Bioimaging and Solvent Sensing Agents”. Indian Patent appl. No. 2184/DEL/2010. International: PCT/IN2011/000610
2. Enzyme-Free Strip Sensor For Estimation Of Ascorbic Acid, Indian Patent appl. No. 3741/DEL/2014
3. Self-healing and recovery of Gelatin-Ionic Liquid, Ionogel, Indian Patent appl. No. 1990/Del/2015.
4. Biocompatible Clay Ionogel Based Non-Enzymatic Oxalic Acid Sensor, Indian Patent appl. No. 201611025920.
5. Hydrogen ion implanted enzyme-free clay based cholesterol sensor, Indian Patent appl. No. 201611029865.
6. Nanoclay and Ionic Liquid Based Electrochemical Sensor for Ascorbic Acid, Citric Acid and Cholesterol Detection, Indian Patent appl. No. 201611032667

Prof. Prasenjit Sen has 8 patents:

1. A novel process for manufacturing silicon nanostructures in single crystalline silicon and silicon nanostructures made thereby useful for making electronic devices

Inventors: (1) JamilAkhtar and (2) PrasenjitSen

Date : 23-03-2001 / NF No. 0224NF2001/ Appln. No. 0326DEL2001

2. A novel technique to suppress leakage current in a planar semiconductor p-n junction

Inventors: (1) JamilAkhtar and (2) PrasenjitSen

Date : 23-03-2001 / NF No. 0224NF2001/ Appln. No. 0326DEL2001

3. A novel process and apparatus for production of metallic nanoparticles

Assignee – Jawaharlal Nehru University

Inventors: Faculty :PrasenjitSen

Students :JoyeeGhosh, Alqudami Abdullah, Prashant Kumar and Vandana

Indian Patent Application No. 840/DEL/2003; Patent granted (June 2006)

4. A novel process and apparatus for production of metallic nanoparticles

Assignee – Jawaharlal Nehru University

Inventors: Faculty :PrasenjitSen

Students :JoyeeGhosh, Alqudami Abdullah, Prashant Kumar and Vandana

PCT application No. PCT/IN2004/000067

5. A novel process and apparatus for production of metallic nanoparticles

Assignee – Jawaharlal Nehru University

Inventors: Faculty :PrasenjitSen

Students :JoyeeGhosh, Alqudami Abdullah, Prashant Kumar and Vandana

USA National Phase application No. 10/562,641

6. A novel process for detecting human haemoglobin variants

Assignee – Jawaharlal Nehru University and Calcutta University

Inventors: Faculty :PrasenjitSen, Anjan K. Dasgupta

Students : Om Parkash and Jaideep Bhattacharya

Indian Patent application number 39/DEL/2006

7. Title :A novel process for detecting human haemoglobin variants

Assignee – Jawaharlal Nehru University and Calcutta University

Inventors: Faculty :PrasenjitSen, Anjan K. Dasgupta

Students : Om Parkash and Jaideep Bhattacharya

PCT application number PCT/IN2007/000002

8. A novel process for detecting human haemoglobin variants  
Assignee – Jawaharlal Nehru University and Calcutta University  
Inventors: Faculty :PrasenjitSen, Anjan K. Dasgupta  
Students : Om Parkash and Jaideep Bhattacharya  
Malaysia National Phase application/ International Clasification C12Q1/68  
Published on 26.02.2010

**24. Areas of consultancy and income generated**  
Nil

**25. Faculty selected nationally / internationally to visit other laboratories / institutions / industries in India and abroad**

More than 20 faculty members have visited foreign laboratories/ universities over the last 4 years.

**26. Faculty serving in**

- a. National committees b) International committees c) Editorial Boards d) any other (please specify)  
Debashis ( Journal of General Relativity), Ram Ramaswamy (Pramana), Sanjay (Phase Transitions), Himadri Bohidar (DST PAC Physical Chemistry), S. Patnaik (DST PAC young scientist), Subhasis Ghosh (UGC- SAP), Riddhi Shah (NBHM)

**27. Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs).**

All faculties need to complete Refresher/ Orientation program as per UGC requirements.

As per UGC norms all the faculties take part time to time in workshops, orientation, refresher course etc.

**28. Student projects**

- percentage of students who have done in-house projects including inter-departmental projects  
All Masters students need to complete a one-semester project ( 4 credits) as part of their M.Sc. degree. Mostly this is carried out at SPS.

- Percentage of students doing projects in collaboration with other universities / industry / institute: About 10%

**29. Awards/recognitions received at the national and international level by**

- Faculty  
Prof. Riddhi Shah, CV Raman Awards for Women in Science (2014)  
Prof. Ram Ramaswamy, J C Bose Fellowship  
Prof. Sanjay Puri, J C Bose Fellowship, Fellow of INSA  
Prof. S. P. Das, Fellow of INSA  
Dr. Pritam Mukhopadhyay, Swarnajayanti Fellowship  
Dr. Brijesh Kumar, Fellow of ICTP
- Doctoral/post doctoral fellows  
Several Ph.D. students have been awarded Humboldt and JSPS fellowships.
- Students  
Several students have been awarded JRF, SRF, UGC-BSR, NBHM fellowships.  
Many have been awarded best poster award in national and international conferences.

**30. Seminars/ Conferences/Workshops organised and the source of funding (national / international) with details of outstanding participants, if any.**

Level	Seminars	Conference	Workshops
<b>Number</b>	150	05 (02 international & 03 national)	01
<b>Sponsoring agencies</b>	JNU	ERC, GEAR, DST, NBHM, ICTP, JNU, UGC-SAP	Indian Academies

1. Science Academies workshop in Ergodic Theory and Dynamical Systems 2012, sponsored jointly by Indian Academies (IASc, INSA, NASc).
2. International Conference on Teichmüller Theory and Interfaces with Ergodic Theory & Group Actions 2013, European Research Grant (ERC), GEAR Network USA, JNU, NBHM. DST.
3. International conference and workshop on Current Trends in Frustrated Magnetism 2015, JNU, ICTP, DST.
4. Three annual conferences (March meetings) of SPS 2013, 2014, 2016 JNU, UGC-SAP.

**31. Code of ethics for research followed by the departments**

Stringent norms are in place to check plagiarism to ensure the authenticity of research carried out at SPS.

32. Student profile programme-wise:

Name of the Programme (refer to question no. 4)	Applications received	Selected		Pass percentage	
		Male	Female	Male	Female
M.Sc (Physics)	6017	21	15		
Ph.D. (Physics)	919	18			
Ph.D. (Chemistry)	403	8			
Ph.D. (Mathematics)	341	3			

33. Diversity of students

Name of the Programme (refer to question no. 4)	% of students from the same university	% of students from other universities within the State	% of students From Universities outside the State	% of Students From Other countries

34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.

This year about 20% (out of 34) of passing out M.Sc. batch has qualified in UGC-CSIR JRF. Most students also qualify national level test such as JEST, GATE, etc.

35. Student progression

Student progression	Percentage against enrolled
UG to PG	NA
PG to M.Phil.	NA
PG to Ph.D.	90%
Ph.D. to Post-Doctoral	90%
Employed <ul style="list-style-type: none"> <li>• Campus selection</li> <li>• Other than campus recruitment</li> </ul>	10%
Entrepreneurs	NA

36. Diversity of staff

Percentage of faculty who are graduates (Ph.D.)	
of the same university	0
from other universities within the State	0%
from universities from other States	70%
from universities outside the country	30%

37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period

All faculty members at SPS join with Ph.D. and post-doctoral experience.

38. Present details of departmental infrastructural facilities with regard to

- a. Library: Number of books in Departmental library is over 4000.
- b. Internet facilities for staff and students: Wifi and LAN internet facility is provided to all students and staff.
- c. Total number of classrooms: 6 with audio video facility.
- d. Classrooms with ICT facility
- e. Students' laboratories : 03

f. Research laboratories: 19

**39. List of doctoral, post-doctoral students and Research Associates**

- a. from the host institution/university  
15 Ph.D./ 0/5
- b. from other institutions/universities  
85/6/5

**40. Number of post graduate students getting financial assistance from the university.**  
About 60 % in M.Sc. and 80% in Ph.D.

**41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.** NA

**42. Does the department obtain feedback from**

**j. Faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilise the feedback?**

Yes, there is a faculty meeting every month and special committee meeting twice a year.

**k. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilise the feedback?**

**l. Alumni and employers on the programmes offered and how does the department utilise the feedback?**

**43. List the distinguished alumni of the Department (maximum 10)**

Sankalpa Ghosh (IIT Delhi)  
Subhabrata Dhar (IIT Mumbai)  
Joey Ghosh ( IIT Delhi)  
Awadesh Kumar ( DU)  
Subir Das (JNCASR)  
Shankar Ghosh (TIFR)  
Saroj Nayak (IIT Bhubaneswar)  
Pragya Shukla ( IIT Kharagpur)  
C S Yadav ( IIT Mandi)  
S. D. Kaushik ( UGC- CSR Mumbai)  
Rakesh Kumar ( Central University of Rajasthan)

Santosh Kumar (Shiv Nadar University)  
Anu Venugopalan (GGS Indraprastha University)

**44. Give details of student enrichment programmes (special lectures/workshops / seminar) involving external experts.**

The school has state of the art computing facilities, well-equipped laboratories for Physics and Chemistry. Students are encouraged to appear for NET, GATE & other competitive exams. Students also work on research based in their last semester. The institution has modern strategies for imparting knowledge like audio-visual aids, OHP, Internet and Computers, Laptops. The classrooms are equipped with green/blackboards, projectors, screens, working models, diagrams, charts, etc. Faculties use a variety of modern tools such as powerpoint presentation to improve student's learning process.

The seminar program of the School has been a vibrant one with 33 talks organised during the past year. Many visitors presented talks on diverse topics in Chemistry, Mathematics and Physics. Talks on diverse topics were presented by many visitors. Some notable one were: Sukumar Das Adhikary, Jayadev Athreya, Stefan Baier, R.C. Budhani, Asit Chakraborti, Nitin Chattopadhyay, Chandan Singh Dalawat, Eknath Ghate, Anish Ghosh, Srubabati Goswami, Rene Lozi, Ross McKenzie, Punyabrata Pradhan, Bharat Ratra, Sumathi Rao, Marco Ruben, Irie Ryo and Md. Sami. Prof. R. Ramaswamy from SPS also organised Science Day lectures by Ashok Jhunjhunwala, Anil Gupta and M.S. Raghunathan with the Indian National Science Academy (INSA) and the Department of Science & Technology.

The students of SPS ran a regular **Journal Club** activity wherein they also invited talks and short courses by eminent researchers from some of the premiere institutes of the country Orientation and Refresher programs.

**45. List the teaching methods adopted by the faculty for different programmes.**

Each faculty in the school designs the teaching and evaluation style of their respective courses. Innovative techniques commonly used for teaching and learning in the school include use of powerpoint presentations and animations to illustrate concepts, design of course websites and

databases for ease of access to consolidated information. For certain courses, open book evaluations are also carried out to test the understanding of students.

**46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?**

Apart from the two quizzes and one mid-term exam, students are given homework assignments regularly that are also graded so the students have a continuous assessment of their progress. Most of the courses have a one-hour tutorial each week that is focused towards problem-solving and discussions regarding the material covered in the lectures to help students check their understanding and clear doubts.

Students are encouraged to participate actively in classes and are trained to solve problems on the spot. This helps to improve the problem-solving skills of the students. The School organises a student-faculty committee meeting every semester to provide a platform for the students to have open discussions with the faculty about their concerns/problems and receive active feedback on the same.

The School presently offers a Masters in Physics and Ph. D. degrees in Physics, Chemistry and Mathematics. For every course and stream, the school assigns student advisors to monitor the progress of students on a more regular basis. The students are encouraged to approach the student advisors on a personal basis as well.

**47. Highlight the participation of students and faculty in extension activities.**

During the last four years, close to 300 peer-reviewed research papers were published by SPS faculty and students in leading journals. Several chapters in books and books were also published by the faculty, including those in the area of impact of science in society. In addition, many of the faculty members, postdoctoral fellows and students presented their work in invited talks and poster sessions at national and international conferences. They were also invited to present seminars and colloquia in different universities and institutes.

SPS has received major funding from the DST under the FIST programme in 2002, 2007 and 2014. It is also worth mentioning that SPS faculty members have attracted considerable individual support through research projects from various funding agencies like the Council for Science & Industrial Research (CSIR), Department of Science & Technology (DST), Department of Biotechnology (DBT), Indo-French Centre for the Promotion of Advance Research (IFCPAR), University Grants Commission (UGC), etc.

**48. Give details of “beyond syllabus scholarly activities” of the department.**

It is a tradition in SPS to organise a scientific conference, called the March meeting, every year to discuss recent developments related to a particular theme. This helps to motivate the Masters and Ph.D. students of the School and enable them to learn about new results from experts in their field. An important goal of the meeting is to give students better exposure to research environment. A poster competition is also organized for the students of SPS, and three prizes are awarded for the best poster presentation. In addition, students have ‘Journal Club’ under which they organise various activities including hosting seminars, etc.

**49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.**

**50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.**

**51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.**

**52. Future plans of the department.**

School of Physical Sciences will expand Chemistry and Mathematics programs in the near future. School is planning to start MSc Chemistry program in 2017-18 and MSc Mathematics in 2018-19.

## EVALUATIVE REPORT OF SCHOOL OF ENVIRONMENTAL SCIENCES

The School of Environmental Sciences was established in the year 1974. The academic programme of the School has been periodically reviewed, revised and updated, keeping in mind the need for sharper focussing, the available expertise at any given time, and the changes desired in the curriculum of individual courses or specific programmes. The school has started its M.Sc degree programme firstly in 1976. The M.Phil./Ph.D. programme started since 1975. The School has diversified interest in various earth, atmospheric and biological processes including environmental pollution and bioremediation. The curriculum has components of disciplinary areas such as physical sciences, earth and atmospheric sciences, environmental biology, and biotechnology.

The School has an interdisciplinary faculty (sanctioned strength: 31; present strength: 23), with specialisation in broad areas of physics, chemistry, geology and biology as related to environment and development issues. In the recent past, the faculty members of the School have received several prestigious international/national awards/fellowships and recognitions including Fellowship of Indian Academy of Sciences, Indian National Science Academy, National Academy of Sciences, National Academy of Agriculture Sciences, Third World Academy of Sciences, Young Scientist Award (CSIR); Scopus Young Scientist Award (Elsevier); Hiyoshi Environmental Award, Alexander von Humboldt Fellow, Leadership in Environment and development(LEAD),MS Krishanan Gold Medal (IGU), Associate Fellow APAS, Geosciences Award.

All the faculty members have projects from different national and international funding agencies including UGC, CSIR, DBT, DST, ICMR, MOEF, UNEP-GEF, Macarthur Foundation, etc.. School has also received grants PURSE (DST), Capacity Build-Up (UGC) XI<sup>th</sup> Plan grant, DST-FIST and UGC-DSA grants during the last five years. These funds were utilised to upgrade the facilities in terms of new books in library,

Instruments, Laboratory facilities and computers. Most of the faculties have established collaborations with scientists outside the University both at national and international level. Research collaborations has been established with Delhi University, CSIR Laboratories, CGWB, NASA, UNESCO, NIPGR, UNU, UNEP, Universities in Sweden, France, Germany and USA; the publications of the faculty partly derive from these collaborations. School has participated in COSIP, COHSSIP, SAP, DSA, DRS, FIST-I and II.

As per the JNU's admission policy, students are drawn from different geographical areas of the country as well as from abroad. After developing an overall understanding of environmental science, the students are provided courses such that they get specialised in one of the four areas: biological, physical, chemical and geological dimensions of environment. The M.Sc. courses are revised from time to time. Recently, in 2010-2011, the course was fully revised and implemented. All the courses were designed and focused on experimental learning. Based on the lectures given in the classes, various labs/experiments have been designed so that students can get hands-on experience on modern analytical techniques, and statistical modelling. Furthermore, field studies have also been carried out by students individually as well as in groups. All the faculty members try to update the knowledge of students in their subjects by citing examples in classes, distributing copies of recent and relevant publications, group discussions. In addition, school arranges seminars and lectures from national and international experts frequently which brush up the knowledge. Students are also given opportunities to attend seminars, symposia, conferences, workshops and training programs within and outside the country. A rich library and laboratory facilities have been created largely from the funds under available special programs like DST-FIST and UGC-DRS/SAP, ENVIS programs and from many other national/international projects implemented by the faculty.

Full freedom is given to students, faculty and staff to express and perform to their best. A formal institution viz.. Student Faculty Committee (SFC) exists in our school to strengthen the academic and research programs. School organises regular meeting of SFC to discuss the issues of curricular and co-curricular activities. Students are encouraged to

participate in outreach programs to develop their community orientation. School has a deep concern about the societal benefits through its current and future academic programs. Time to time students and faculty are encouraged to take-up the research projects of public concern and participate in the meeting, demonstration, discussion, debates, etc. Various faculty members periodically deliver talks to spread environmental awareness in public.

In the coming years new courses/research areas in the frontier areas viz. Global Climate Change, Renewable Energy Resources, Wildlife Conservation, Environmental Health, Natural Resource Accounting, Oceans and Environment, Disaster Management and Forecasting would be initiated. Upgradation of Common Instrumental Facilities (CIF) and procurement of new equipment including GC-MS, ICP-MS, NMR, LC-MS, Flow Cytometer, Mobile Environmental Monitoring Lab by developing new project proposals would be undertaken.

EVALUATIVE REPORT OF THE DEPARTMENT  
( 1 April 2012- 31 March 2016)

1. **Name of the Department** : School of Environmental sciences
2. **Year of establishment** : 1974
3. **Is the Department part of a School/Faculty of the university?** Yes
4. **Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt., etc.):** M. Sc, M. Phil, Ph D.
5. **Interdisciplinary programmes and departments involved:** Yes  
School is taking part in the teaching of the course on Environmental education in the school of language, literature and cultural studies. School does offer its courses to the students of other science schools throughout the year in both semesters
6. **Courses in collaboration with other universities, industries, foreign institutions, etc.**  
School is taking part in the teaching of the course on Environmental education in the school of language, literature and cultural studies. School does offer its courses to the students of other science schools throughout the year in both semesters
7. **Details of programmes discontinued, if any, with reasons:** None all are going well and continuing
8. **Examination System: Annual/Semester/Trimester/Choice Based Credit System:**  
  
Semester system with short term quizzes, presentations, term papers, mid term and end term examination
9. **Participation of the department in the courses offered by other departments:**  
Yes the students of school join the courses
10. **Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/Asst. Professors/others)**

	Sanctioned	Filled	Actual (including CAS & MPS)
Professor	10		
Associate Professors	14		
Asst. Professors	12		

**11. Faculty profile with name, qualification, designation, area of specialization, experience and research under guidance**

<b>Name</b>	<b>Qualification</b>	<b>Designation</b>	<b>Specialization</b>	<b>No. of Years of Experience (In JNU)</b>	<b>No. of Ph.D./ M.Phil . students guided for the last 4 years</b>
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Prof. S Mukherjee	PhD,	Professor	Remote Sensing &	24	5
Prof. K G Saxena	PhD	Professor	Geology	22	2/2
Prof V K Jain (On Deputation)	PhD	Professor	Botany & Ecology	29	7
Prof. A.K.Attri (Retired)	PhD	Professor	Physics	28	4
Prof. S.Bhattacharya (Retired)	PhD	Professor	Environmental Science	28	6
Prof. P.S.Khillare	PhD	Professor	Biochemistry	24	3/3
Prof. A L Ramanathan	PhD	Professor	Air Pollution Chemistry	16	7/7
Prof. U C Kulshreshtha	PhD	Professor	Marine Geology, Glaciology	9	3/3
Prof. K Mukhopadhyay	PhD	Professor	Pollution Chemistry	9	2/1
Prof.K Kumar	PhD	Professor		13	2/2
Prof. A P Dimri	PhD	Professor	Biophysics Biochemistry	9	2
Prof.NJ Raju	PhD	Professor		9	3/5
Prof.D Mohan	PhD	Professor	Environmental Sciences	9	3/3
Prof.S C Garkoti	PhD	Professor	Metereology	9	1/2
Prof.P K Joshi	PhD	Professor	Geochemistry	2	
Dr.NNSidhaiyah	PhD	Asso.Prof	Chemistry	9	3
Dr.J K Tripathi	PhD	Asso.Prof	Ecology	9	4/4
Dr.I Ghosh	PhD	Asso.Prof	Botany Ecology	9	4/1
Dr.P.Rajamani	PhD	Asso.Prof	Geochemistry	9	7/2
Dr.A.K.Srivastava	PhD	Asstt.Prof	Geochemistry	9	2/4
Dr.S Yadav	PhD	f	Biology	9	2/2
Dr.M Dua	PhD	Asstt.Prof	Biophysics	8	1/1
Dr.Vijay Pal	PhD	Asstt.Prof	Env.Sciences	5	
		f	Chemistry		
		Asstt.Prof	Biology		
		f	Biology		
		Asstt.Prof			

**12. List of Senior Visiting Fellows, adjunct faculty, emeritus professors**

Prof. Kasturi Datta: Senior scientist INSA  
 Prof. V. Rajamani: emeritus professors  
 Prof. C K. Varshney: emeritus professors  
 Prof. P S. Ramakrishnan: visiting fellow  
 Prof. Sudha Bhattacharya: BSR fellow

**13. Percentage of classes taken by temporary faculty – programme-wise information**

None

**14. Programme-wise Student-Teacher Ratio**

M. Sc.

M. Phil/Ph. D.: 8:1

**15. Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual**

Technical	Sanctioned	Filled	Actual (including CAS & MPS)
Technical Officer			1
Sr. Tech Assistant			2
Tech. Assistant			3
Sr. Lab Assistant			3
Lab. Assistant			7

**16. Research thrust areas as recognized by major funding agencies:**

Physical, Chemical, Biological, Geological and human dimensions of environment and development

**17. Number of faculty with ongoing projects from a) National b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.**

**18. Inter-institutional collaborative projects and associated grants received**

a. National collaboration

**b. International collaboration**

1.	Dr Sudesh Yadav	Association of POPs--- Indian adults	INDO-US scheme ICMR-NIH Funding	Rs 34 Lacs
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	Prof. Dinesh Mohan	Mississippi State University under 21 Century Knowledge Technology Development	(known as Singh-Obama project)	
	Prof. S. Mukherjee	on Polluted Groundwater remediation using Cupric Oxide Nanoparticles	International collaboration with University of Wyoming, USA	

**19. Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received.**

- Currently, School is running DSA SAP II programme: with non-consumable funding of ~Rs 97.00 Lacs and Rs 18.2 Lacs recurring grants per year
- School is also running MOEDCC funded ENVIS centre since last more than twenty years with current total grants of Rs 11 Lacs per year

**20. Research facility/centre with**

- state recognition
- national recognition

**21. international recognition: Special research laboratories sponsored by / created by industry or corporate bodies: **none the efforts are on and are likely to be created by the end of this year****

**22. Publications:**

- \* Number of papers published in peer-reviewed journals (national/international): 600 (in five years)
- \* Monographs: 100
- \* Chapters in Books: 50
- \* Edited Books: 20

- \* **Books with ISBN with details of publishers**
- \* **Mukherjee. S.(2012). Sun-Earth-Cosmic connection ISBN 978-3-8443-0731-3 LAP Lambert Academic Publishing Germany**  
<http://www.springer.com/earth+sciences+and+geography/earth+system+sciences/book/978-81-322-0729-0>
- \* Mukherjee, S. (2013). Extraterrestrial Influence on Climate Change , ISBN 978-81-322-07290 Springer. <http://www.springer.com/earth+sciences+and+geography/earth+system+sciences/book/978-81-322-0729-0>
- \* Mukherjee S with Srivastava, P.K, Gupta, M and Islam, T.(2014). Remote sensing applications to environmental research. Springer.  
<http://www.springer.com/earth+sciences+and+geography/geophysics/book/978-3-319-05905-1>
- \* Mukherjee Saumitra with Islam T, Srivastava P.K. , Gupta, M and Zhu,X. (2014). Computer Intelligence Technique in Earth and Environmental sciences, Springer. Published by Springer Verlag, USA. ISBN 978-94-017-8642-3. <http://www.springer.com/environment/book/978-94-017-8641-6>
- \* **Saxena, K.G.**, Rao, K.S. and Maikhuri, R.K. 2014. Soil as A Living Body. In: Textbook of Plant Nutrient Management. Edited by R. Prasad, D. Kumar, D.S. D.S., Y.S. Shivay and R.K. Tewatia, R.K. Indian Society of Agronomy, Indian Agricultural Research Institute, New Delhi. 23-47.
- \* Abhishek K. Gupta and **Sudha Bhattacharya** (2015) Ribosomal RNA Genes and their Regulation in *Entamoeba histolytica*. In Amebiasis: Biology and pathogenesis of Entamoeba. T. Nozaki and A. Bhattacharya, eds. Springer, pp. 119-135.
- \* Vijay Pal Yadav and **Sudha Bhattacharya** (2015) The Biology of Retrotransposition in *Entamoeba histolytica*. In Amebiasis: Biology and pathogenesis of Entamoeba. T. Nozaki and A. Bhattacharya, eds. Springer, pp. 151-170
- \* Sundaram, S. and **Thakur, I.S.** 2015. Isolation and characterization of thermotolerant *Bacillus* sp. strain IST2 for carbon dioxide sequestration. Ed. Raju, N.J., Gossel, W., Ramanathan, A.L. and Sudhakar, M. In. Management of natural resources in the era of climate change: Emerging issues and challenges. Springer., pp. 308-316.

- \* Ghosh, P., Krishna, M., Das, M.T. and **Thakur, I.S.** 2015. Bioremediation and detoxification of xenobiotic organic compounds in landfill leachate by *Pseudomonas* sp. ISTDF1. Ed. Raju, N.J., Gossel, W., Ramanathan, A.L. and Sudhakar, M. In. Management of natural resources in the era of climate change: Emerging issues and challenges. Springer. pp. 219-228.
- \* Mishra, M. and **Thakur, I.S.** 2015. Biodegradation of lignocellulosic waste in the environment, Ed. Rama Chandra, Advances in biodegradation and bioremediation of environmental waste. CRC Press, pp. 155-180.
- \* Ghosh, P. and **Thakur, I.S.** 2015. Treatment of landfill leachate in a sequential bioreactor using white rot fungi and bacteria the international conference on solid wastes 2015: knowledge transfer for sustainable resource management, Ed. Wong, J. et al., Hongkong.
- \* **Mukherjee, Saumitra** (2014). Procedure for selection of check dams site in Rain water harvesting. Chapter 23, Handbook of Engineering Hydrology, Fundamentals and Applications. Pp 486-500 CRC Press <http://www.crcpress.com/product/isbn/9781466552418>
- \* S.N.Sashtri, A.Singh, **Mukherjee Saumitra**, S. Eslamian and C.K.Singh (2014). Groundwater Exploration: Geophysical remote sensing and GIS Techniques. Handbook of Engineering Hydrology, Fundamentals and Applications. Pp CRC Press <http://www.crcpress.com/product/isbn/9781466552418>
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- \* Number listed in International Database (For e.g. Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.)
  - \* Citation Index – range/average
  - \* SNIP
  - \* SJR
  - \* Impact Factor – range/average
  - \* h-index

### 23. Details of patents and income generated:

- a. **Technology developed**
  - i. Biofuel from carbon dioxide concentrating bacteria, *Serratia* sp. ISTD04.
  - ii. Biofuel production from algae, *Scenedesmus* sp.
  - iii. Biodiesel production from cyanobacteria, *Leptolinybia* sp. ISTCY 101.
- b. **Others: Whole genome sequencing-1.** Carbon dioxide sequestrating bacteria, *Serratia* sp. and *Pandoreae* sp. for biovalorization of lignin in waste

### 24. Areas of consultancy and income generated:

none

**25. Faculty selected nationally / internationally to visit other laboratories / institutions/ industries in India and abroad**

**26. Faculty serving in**

- a. National committees, b) International committees, c) Editorial Boards
- b. any other (please specify)

The faculties of the school are members of many committees of national repute such as DST, DBT, CGWB, GSI, UPSC, CSIR, ICMR, INSA, NIO, MOEFCC, MoES, academic bodies of many universities and institutions. Many teachers are on the editorial boards of journals of high repute.

**27. Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs).**

Teachers take part in UGC-HRDC, Refresher/orientation programs, workshops, training programs and similar programs from time to time.

The school faculty is also coordinator of refresher courses in interdisciplinary science. Other faculties act as a resource person in the HRDC at JNU and other universities.

**28. Student projects**

- Percentage of students who have done in-house projects including inter-departmental projects: 100%. **All masters students do a project during their masters degree.**
- Percentage of students doing projects in collaboration with other universities / industry/institute: **time to time students take part in projects in associations with labs at another institute.**

**29. Awards/recognitions received at the national and international level by**

- Faculty  
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- Doctoral/post doctoral fellows  
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- Students

Development and application of Fe-biochar composite for arsenic from water, Prachi Singh and Dinesh Mohan. In Arsenic Research and Global Sustainability, Proceedings of the Sixth International Congress on Arsenic in the Environment (As2016), Page 539-540. Edited by Prosun Bhattacharya, Marie Vahter, Jerker Jarsjö, JurateKumpiene, Arslan Ahmad, Charlotte Sparrenbom, Gunnar Jacks, Marinus Eric Donselaar, JochenBundschuh, Ravi Naidu. CRC Press June 1, 2016, ISBN 9781138029415 - CAT# K28953

- Best poster presentation awarded to Prince Kumar (Ph.D scholar) in National Science Day organised by DST at JNU, New Delhi, on 28th February 2017
- Punia A. and Siva Siddaiah N (2016). Abandoned mines and their environmental risk: A case study from Khetri, Rajasthan, India.NCEPIAR-2016, SES, JNU, New Delhi.
- Bhagita Devi, M. and Siva Siddaiah N (2016). Floating Phumdis of Loktak Lake, Manipur: Importance of Their Conservation for Sustainable Water Quality at NCEPIAR-2016, SES, JNU, New Delhi.
- Singh, S.K, Singh, S, Chaudhary, A. Siva Siddaiah, N. and Tripathi, J. K (2017). Geochemistry of roadside sediments along the Ghaziabad-Meerut road (NH 58), India.UGC-SAP (DRS) National Seminar on Recent Advances in Environmental Toxicology, JamiaMiliaIslamia, New Delhi
- Best oral presentation awarded to Dr. Seema Joshi (D.S. Kothari fellow) in 6th Indian Peptide Symposium (Indian Peptide Society) held at Mumbai on February 23rd to 24th February 2017.

**30. Seminars/ Conferences/Workshops organised and the source of funding (national / international) with details of outstanding participants, if any.**

School of Environmental Sciences, JNU organised one day National Conference on Environmental Pollutants: Impact Assessment and Remediation (NCEPIAR-2017) with the support from UGC-SAP-DSA-II. It was oriented to invite young researcher from the country and was focussed as Young Scholar's Meet. Wide

publicity was given by JNU website and sending posters to various institutes throughout country. Very enthusiastic response was received, and more than 50 abstracts were received for the conference. Out of which 20 were selected for poster presentation, and 14 were selected for Oral Presentation by a subject expert committee of the School. The conference was inaugurated by remarks from Prof. S. Mukherjee, Dean SES and Prof.Chintamani Mahapatra, Rector, JNU. Two renowned scholars Prof. Pradyut Bhattacharya from GGSIP University and Prof. A.K. Attri (Former Dean, SES) were invited to deliver lectures. Prof. P. Bhattacharya enlightened participants by his talk on “Urban Air Pollution Remediation Strategy through the Lens of Sustainable Development” and Prof.Attridelivered lecture on “Status of Total Ozone Column Variability over Indian sub-continent (0-40°N) with reference to the corresponding Variability in multiple environmental factors: Annual cycle, QBO, ENSO and Solar cycle (1979-2012)”. A total of 12 young scholars presented their research by Oral Presentation in two sessions (Technical session-I & Technical session-II) chaired by Prof. Sudha Bhattacharya & Dr. N.S. Siddaiah (TS-I) and Prof. AL Ramanathan & Prof. Krishan Kumar (TS-II). About 21 Young scholars presented their posters which were evaluated by an expert committee of the School. 6 young Scholars were given awards for Best Oral Presentation and Best Poster Presentation by Prof. S.C. Garkoti, Rector-II, JNU.

**31. Code of ethics for research followed by the departments**

The faculty has developed a course on ethics in teaching and research which is offered to the students in one semester every year. The research students are also made aware about the ethics in research and publications such as plagiarism, copying, etc. from time to time.

32. Student profile programme-wise:

Name of the Programme (refer to question no.	Applications received	Selected		Pass percentage	
		Male	Female	Male	Female
<b>M.Sc.,</b>	4164	5	10		
<b>MPhil./PhD</b>	1195	10	11		
<b>PhD.</b>	59	2			
<b>JRF</b>	<b>37</b>	<b>6</b>			

33. Diversity of students:

Name of the Programme (refer to question no. 4)	% of students from the same university	% of students from other universities within the State	% of students from universities outside the State	% of students from other countries

34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise. Not Available

35. Student progression

Student progression	Percentage against enrolled
UG to PG	Not applicable
PG to M.Phil.	95%
PG to Ph.D.	95%
Ph.D. to Post-Doctoral	50%

<b>Employed</b> • <b>Campus selection</b> • <b>Other than campus recruitment</b>	<b>80%</b>
<b>Entrepreneurs</b>	<b>2%</b>

**36. Diversity of staff**

<b>Percentage of faculty who are graduates</b>	
<b>of the same university</b>	<b>7</b>
<b>from other universities within the State</b>	<b>3</b>
<b>from universities from other States</b>	<b>12</b>
<b>from universities outside the country</b>	<b>1</b>

**37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period: None**

**38. Present details of departmental infrastructural facilities with regard to**

- a. Library: yes fully functional
- b. Internet facilities for staff and students: ye to all via lane and wifi
- c. Total number of classrooms: five
- d. Classrooms with ICT facility: five
- e. Students' laboratories: one
- f. Research laboratories: 30

**39. List of doctoral, post-doctoral students and Research Associates**

- a. from the host institution/university: 4

- b. from other institutions/universities: 8
- 40. Number of postgraduate students getting financial assistance from the university:**  
11
- 41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.**
- 42. Does the department obtain feedback from**
- m. Faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilise the feedback?**  
Yes, every teacher takes the feedback and same being discussed in faculty meetings for improving on a periodic basis.
  - n. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilise the feedback?**  
Yes, every teacher takes the feedback and same being discussed in faculty meetings for improving on a periodic basis.
  - o. Alumni and employers on the programmes offered and how does the department utilise the feedback?**  
Yes, school call our retired teachers and staff and interacts with them for taking their guidance in starting new research areas and teaching.
- 43. List the distinguished alumni of the Department (maximum 10)**
- 44. Give details of student enrichment programmes (special lectures/workshops/seminar) involving external experts.**
- A total 27 lecture by eminent experts who visited the school has delivered lectures in the school. All such lectures take place in the evening session and are open to all students and faculty.
- 45. List the teaching methods adopted by the faculty for different programmes.**
- 46. How does the department ensure that programme objectives are constantly met, and learning outcomes are monitored?**

This being discussed among faculty with a frequency of one meeting per month and the outcome is being discussed in special committee meeting twice a year.

**47. Highlight the participation of students and faculty in extension activities.**

Students and faculty regularly take part in extension activities by conducting seminars, organising earth day, environment, day, ozone day, visiting the nearby areas of environmental importance for creating awareness. We do take part extensively for development and conservation of our environmental indicator sin JNU by extension activities.

**48. Give details of “beyond syllabus scholarly activities” of the department.**

This is one major strength of the department that faculty goes step ahead and beyond the syllabus to incorporate updated and recent research in their respective area in their teaching and research.

**49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.**

Yes by NAAC

**50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.**

The school faculty is involved in generation of new protocols of analysis of environmental components, new tools of remote sensing, space sciences, remediation techniques for Arsenic and Fluoride contamination, alternate energy options such as extraction of bio-fuel and its practical testing, ground water hydrology, rain harvesting, incorporating Chanderyan and Mangalyan data to correlate with earth system sciences.

**51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.**

**Strength:** 1. Interdisciplinary approach with periodic revisions of syllabi  
2. State of art instrumentation  
3. Placement of the students  
4. Funding from national and international agencies  
5. Publications of high impact factor Journals

**Weakness:** 1. Limited space in terms of infrastructure lab/office space  
2. Vacant teaching and non-teaching positions

3. The timing of entrance exam which limits the intake of students.

**Opportunities and Challenges:**

1. Getting research into the application mode for societal development
2. Attracting funding from international programmes
3. Outreach programme Environmental science at each level of society.

**52. Future plans of the department.**

New courses/research areas in the frontier areas viz. Global Environmental Change, Renewable Energy Resources, Wildlife Conservation, Environmental Health, Natural Resource Accounting, Oceans and Environment, Disaster Management and Forecasting would be initiated.

Collaborations with Utrecht University, Netherlands, Essex University, UK for joint teaching and research programmes shall be developed.

Upgradation of Common Instrumental Facilities (CIF) and procurement of new equipment including GC-MS, ICP-MS, NMR, LC-MS, Cytometer, Mobile Environmental Monitoring Lab by developing new project proposals

Undergraduate courses in Environmental Studies in other Departments, e.g., School of Languages, will be introduced.

An annexe building is under consideration

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2. Mansuri MS, Babuta M, Ali MS, Bharadwaj R, Jhingan GD, Gourinath S, Bhattacharya S, Bhattacharya A. (2016) Autophosphorylation at Thr279 of *Entamoeba histolytica* atypical kinase EhAK1 is required for activity and regulation of erythrophagocytosis. *Sci Rep.* 2016 Jan 7;6:16969. doi: 10.1038/srep16969.
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7. Shraddha Sharma, Neha Banyal, Singh Mukul, Mandal AK, Bhattacharya Sudha, Paul Jaishree. SINE polymorphism reveals distinct strains of *Entamoeba histolytica* from North India. *ExpParasitol.* 2017 Jan 25. pii: S0014-4894(16)30230-2. doi: 10.1016/j.exppara.2017.01.007.
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#### Research projects:

1. S. Mukherjee: Study of the identification of unique morphological features on polar lunar surfaces. 2016-2019 Funded by ISRO Grant: 7 Lakhs 2016-2019
2. S Mukherjee: Study of geomorphological features and associated signature detection to infer geological processes and possible presence of water and life forms within and around large impact craters in the equatorial Martian region. ISRO 8 Lakhs 2016-2019 8 Lakhs
3. S.Mukherjee C PI with C.K Singh Targeting low-arsenic and low-fluoride groundwater to reduce exposure in rural Punjab, India with Alexander van Geen of Lamont-Doherty Earth Observatory, Columbia University) Project Dates: August 2013 to January 2018 [http://sites.nationalacademies.org/PGA/dsc/peerscience/PGA\\_084035](http://sites.nationalacademies.org/PGA/dsc/peerscience/PGA_084035) Sponsored by DSC ,The National Academies 500 5th St NW - KWS 502 Washington, DC 20001 USA
4. S.Mukherjee. Application of satellite remote sensing to support water resources management in the Medjerda watershed: Impacts on the hydrological and

hydrogeological functioning in the lower valley of the basin. Indo Tunisian project. 2013-2017. 36 Lakhs

5. Sub-Surface Geological interpretation using Satellite Data in Thar Desert Area of Rajasthan. Sponsored by Ministry of Defense Government of India.( This project is to assist Indian Army)
6. Remote sensing and Geoinformatics of Environment of Delhi and surrounding area. " In this project the monitoring of Ground water quality is being done for which partly the support of the DRS is being used.

## EVALUATION REPORT SPECIAL CENTRE FOR MOLECULAR MEDICINE

On the basis of the University Grants Commission's IX plan recommendations, the 'Special Centre for Molecular Medicine' was established in the year 1999 under the auspices of Jawaharlal Nehru University. The purpose of the SCMM is to foster research in the field of molecular and cell biology with direct application to the study of human disease. The format of the SCMM center is a new concept that had not been attempted before at least in our country. The major emphasis is on the multidirectional flow of information between the laboratory, and the clinical arena leading to the translation of basic discoveries into clinical innovation which will change the impact of disease on our society. As originally conceived and approved by the Advisory Committee, chaired by then DG, ICMR, the SCMM is currently focusing on the area of research in the field of Infectious Diseases: Malaria, hepatitis C, Leishmaniasis, Helicobacter pathogenesis, Candidiasis, Host-Microbe Relationship, Tight Junctions in bacterial and viral pathogenesis ; Metabolic disorders: diabetes type 2, cardiovascular diseases nuclear hormone receptors in health & disease, Neurodegenerative disorders; Molecular Diagnostics: Genetic profiling of pathogenic fungus and development of genetic tools to identify pathogenic organisms and has plan to extend it to translational research.

To fulfil the objective of the Centre, there are well qualified, experienced, and competent researchers as faculty members, have well-equipped laboratories supplemented by common instrumental facilities. All the laboratories are equipped with computers having internet links to access major journals online through University library. Class room is equipped with LCD projector for power point presentation and internet facility. All the research projects undertaken are funded by national and international agencies like CSIR, DBT, DST, ICMR and Wellcome Trust, European Commission, etc. The Centre has also received support from SAP (UGC), BSR (UGC), PURSE (DST), Capacity Build-

Up (UGC) and XI<sup>th</sup> Plan grant during the last five years and utilised it to upgrade availability of new books in the library, Instruments, Laboratory facilities and computers. Over the last five years, the Centre has successfully completed 10 such projects. Fourteen (10-National, 04-International) research projects are in progress.

Since inception the Centre has been collaborating with other Science Schools of the University and with several Research Institutes, Universities like AIIMS, Safdarjung Hospital, GB Pant Hospital, International Centre for Genetic Engineering and Biotechnology, National Institute of Immunology, Cleveland Clinic Foundation, USA, Harvard School of Public Health, Boston, USA, Michigan University Centre for Medicine, USA and Kyoto Prefectural University of Medicine, Kyoto, Japan. St. Jude Children's Research Hospital, Memphis (USA), Case Western Reserve University (USA), Albert Einstein Cancer Center, Albert Einstein College of Medicine (USA) at the national & international level to achieve its primary objective.

As a direct outcome of our effort, so far we trained 6 medical science graduates to complete their PhD out of 26 total students completed so far. Moreover, 20% of current students enrolled in PhD program are also Medical graduates. The Medical students who completed the program are presently either employed as a scientist in the country or pursuing postdoctoral training abroad. Several of our students have received best poster awards in National/International symposia.

In collaboration with leading Medical Institutions, several studies have been carried out in the thrust areas of molecular medicine and have published significant numbers of joint research papers in peer-reviewed international journals. Over the last five years, 44 research papers having an average impact factor of 4 and 2 book chapters have been published. Other achievements are given below.

- A patent has also been filed relation to high-throughput screening of drugs.

- Large numbers of students from basic sciences, clinical science and biotechnological institutes have been trained in molecular cell biology, microbiology, DNA fingerprinting, etc. over the last 10 years.
- A Fellowship (Dr. Pani fellowship) has been started exclusively for medical graduates to get training in the area of molecular medicine.
- A biannual symposium is being conducted (four so far) that includes equal numbers of medical and basic scientists from national and international level.
- SCMM also received highest appreciative remarks from UGC XIth plan committee for several of these achievements and approved several faculty positions to expand the current strength of six to twelve.

The Centre admits students into the PhD programme through national level entrance test complying with the reservation policy of the Government. About 2000 candidates per year apply for admission in our Pre-PhD programme. To encourage Medical graduates to pursue PhD, a minimum number of such students/ or otherwise experienced researchers are admitted to the direct-PhD programme through interviews only. By these means, the Centre is able to attract students from a diverse background of the country and neighbouring country Bangladesh. Overall male: female ratio is 46: 54 and admitted students represent 17 different states of the country. More than 90% of the total students are UGC/CSIR/ ICMR/DBT National Fellowship recipients.

The Pre-PhD courses offered by the Centre are revised on the basis of student's suggestion, concerned faculty's conception and assessment of the faculty committee of the Centre and final approval of the Special Committee of the Centre. The activities of the Center, especially syllabi/curriculum are monitored by the Special Committee of the Center. The said committee is constituted with eminent academicians/scientist/clinician engaged in active research both from the University and neighbouring Institutes/ Universities. The said committee meets at least twice a year to monitor center's activities. During the last five years, two new courses are introduced, and two are modified or replaced. The Centre adopts more interactive teaching programme through the slide and

online presentation, regular evaluation of classes, project proposals writing and defense, regular Journal Club, etc. Additionally, whenever required faculty members participate in academic and personal counselling of students. During last five years the drop-out rate of students from Pre-PhD/PhD program is very minimal about 2.5% (out of 37, 01left PhD programme for personal reasons/ got faculty position). Two recently joined Assistant Professors are planning to join the faculty development programme like Refresher course and/or Orientation programme in specialised subjects offered by Academic Staff College, UGC. Faculties also take part in various National and International Seminar/Workshop for updated knowledge in the respective fields. Faculties are serving various committees of the University as academic committee member, purchase committee members, research personnel recruitment interviews as well as members of the thesis advisory committees in the JNU and outside. The faculty members of the Centre have received several prestigious International/National Awards/ Fellowships and Recognitions in the recent past – namely, International Senior Research Fellowship, Wellcome Trust London (Two Fellowships); Members of Guha Research Conference (Two Members); Fellows of the National Academy of Sciences, Allahabad (Two Members); Gold medal oration award by the Society of Reproductive Biology and Comparative Endocrinology (SRBCE) for significant contribution in the area of Molecular and Cellular Endocrinology; Alexander Von Humboldt Fellowship (Humboldt Foundation, Germany); Swarnajayanti Fellowship by Department of Science and Technology, Govt. of India; Wellcome Trust-DBT Alliance Senior Research Fellowship; DBT- National Biosciences Award for career development; R21-NIH Grants, USA.

In the coming years, the Centre is planning to introduce a research-based Masters Programme combined with PhD degree (Integrated MSc-PhD programme) in Molecular Medicine and extend thrust area of teaching and research to medicinal/natural product chemistry, bioinformatics/structural biology and translational biology. The Centre is also planning to induct new faculty members including clinicians having MBBS-PhD, MD or MD-PhD degree to fulfil our original objectives and for strengthening molecular

medicine in the country. In a direct output, this will increase the uptake of medical graduates in PhD program and strengthen clinical research activities. Our collaborative activities will be continued with same vigour. One of our primary objectives was to train clinicians and hospital technicians in modern biochemical and molecular cell biological technologies. During the last 10 years, we have provided such training to numbers of science and technology graduates and provided service to medical postgraduates. We would like to continue to enlarge our endeavour in this direction by arranging workshop specially designed for doctors with hands-on training in the thrust areas.

In conclusion, the Centre is poised to cater to a new community of medical scientists with a view to translate our discoveries from the bench to bedside. We have also successfully implemented our original objectives and will continue to broaden our training programs to include all areas of modern biology.

**Evaluative Report of the Department  
(2012-2016)**

1. Name of the Department:

**SPECIAL CENTRE FOR MOLECULAR MEDICINE**

2. Year of establishment: **1999**

3. Is the Department part of a School/Faculty of the university?: **Yes**

4. Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt., etc.): M.Sc.:  
**Integrated M.Sc.-Ph.D., Pre-Ph.D. & Ph.D. in Molecular Medicine**

5. Interdisciplinary programmes and departments involved:

- **Integrated M.Sc.-Ph.D. in Molecular Medicine is highly interdisciplinary teaching programme, where we teach the subjects i.e. Structural Biology, Physiology, Anatomy, Biochemistry, Toxicology, Pharmacology Bioinformatics & Immunology.**
- **The faculty from ILBS, AIIMS, THSTI, DU, Jamia University are also invited to teach few topics of certain courses of M.Sc. Programme.**

6. Courses in collaboration with other universities, industries, foreign institutions, etc.  
**The Integrated M.Sc. in Molecular Medicine being taught by several guest faculty from different institution/universities.**

7. Details of programmes discontinued, if any, with reasons: **Nil**

8. Examination System: Annual/Semester/Trimester/Choice Based Credit System  
**Semester-wise & Choice based**

9. Participation of the department in the courses offered by other departments: **Nil**

10. Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/Asst. Professors/others)

	Sanctioned	Filled	Actual (including CAS &)
Professors	05	06	Including 01 post filled as Professor against Assoc. Prof. post
Associate Professors	08	04	
Asst. Professors	02	02	
Others	<b>16</b>	<b>11</b>	

11. Faculty profile with name, qualification, designation, area of specialisation, experience and research under guidance

Name	Qualification	Designation	Specialization	No. of	No. of
<b>G. Mukhopadhyay</b>	Ph.D.	Professor	<i>Helicobacter pylori</i> type IV protein	18	<b>05</b>
<b>C.K. Mukhopadhyay</b>	Ph.D.	Professor	Role of Iron and Oxygen in Pathobiology	21	<b>08+04*</b>
<b>Rakesh K. Tyagi</b>	Ph.D.	Professor	Nuclear receptors in health and	24	<b>09+04*</b>
<b>Suman K. Dhar</b>	Ph.D.	Professor	DNA replication in <i>Helicobacter</i> regulation in <i>Plasmodium falciparum</i>	19	<b>08+05*</b>

Name	Qualification	Designation	Specialization	No. of	No. of
<b>Vibha Tandon</b>	Ph.D.	Professor	Chemical Biology, Medicinal Chemistry & Drug Discovery	25	<b>06*</b>
<b>Gobardhan Das</b>	Ph.D.	Professor	Immunology of Mycobacterium infection	19	<b>06*</b>
<b>Anand Ranganathan</b>	Ph.D.	Associate Professor	Inhibiting Protein- Protein Interactions in Pathogens	10	<b>04*</b>
<b>Souvik Bhattacharjee</b>	Ph.D.	Associate Professor	Understanding mechanism of development of drug- resistance in malarial	10	<b>04*</b>
<b>Shailija Singh</b>	Ph.D.	Associate Professor	Parasitic infections, molecular mechanisms of host pathogen	12	<b>02*</b>
<b>Saima Aijaz</b>	Ph.D.	Assistant Professor	Role of tight junctions in pathogenesis	12	<b>03+04*</b>
<b>Dipankar Ghosh</b>	Ph.D.	Assistant Professor	<b>Early host-microbe relationships, Innate Immunity</b>	<b>10</b>	<b>03*</b>

*\*Currently registered Ph.D. students*

12. List of senior Visiting Fellows, adjunct faculty, emeritus professors:

**Adjunct faculty: 07**

**1. Prof. Asis Datta**, Professor Emeritus,

National Institute of Plant Genome Research, New Delhi – 110 067

**2. Prof. Rajendra Prasad**

School of Life Sciences, JNU, New Delhi – 110067

**3. Prof. Kasturi Datta**,

DBT Distinguished Biotechnology Professor

School of Environmental Sciences, JNU, New Delhi – 110 067

**4. Prof. Shyamal K Goswami**

School of Life Sciences, JNU, New Delhi – 110 067

**5. Dr. Shiv K. Sarin**

Director, Institute of Liver & Biliary Sciences (ILBS), New Delhi – 110 070

**6. Dr. Amitabha Chattopadhyay**

J.C. Bose Fellow, Outstanding Scientist (Director Level), CCMB, Uppal Road,  
Hyderabad

**7. Prof. Tapas Kumar Kundu**

Silver Jubilee Professor, Jawaharlal Nehru Centre for Advanced Scientific Research,  
Jakkur, Bangalore – 110 064

13. Percentage of classes taken by temporary faculty – programme-wise information

**Around 10 guest faculties (from other institution/universities) with expertise in broad areas were requested to take courses pertaining to the following courses that commenced in the year 2015-16:**

**(i) Diseases of National Importance (03 Credit) Semester IV of Integrated MSc-PhD Programme**

**(ii) Anatomy and Physiology of Human Body (03 Credit) Semester I, Integrated MSc-PhD Programme**

14. Programme-wise Student-Teacher Ratio: **1:8**

15. Number of academic support staff (technical) and administrative staff: sanctioned,

filled and actual:

Academic support staff (technical & )	Sanctioned	Filled	Actual (including CAS & MPS)
Sr. Technical	01	01	
Lab. Assistant	01	01	
Lab. Attendant	01	01	
Junior Asst-cum-typist	01	01	
Office Attendant	01	01	
Computer Operator	--	--	01 Contractual Staff (Through Service Provider)
Laboratory Attendant	--	--	01 Contractual Staff (Through Service Provider)

16. Research thrust areas as recognised by major funding agencies  
 Special Centre for Molecular Medicine is planning to expand its scope in the frontier areas of '*Infectious Diseases, Metabolic Disorders & Drug Design*' with an approach towards studies on '*Molecular targets, Molecular Diagnostics and Translational Research*'. Four more faculties have joined SCMM during the January-February of 2014 & mid of 2015. They will be focusing on teaching and research in the areas of 'Chemical Biology and Drug Development' (Prof. Vibha Tandon), 'Immunology' (Prof. Gobardhan Das), 'Genetically engineered biomolecules, codon-shuffling, pathogenesis of tuberculosis and dengue'(Dr. Anand Ranganathan) and 'Biology of Plasmodium falciparum infection, Protein trafficking pathways in malaria-infected erythrocytes, Molecular mechanism for antimalarial drug-resistance'(Dr. Souvik Bhattacharjee).
17. Number of faculty with ongoing projects from a) National b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.

Name of the Investigator	Title of the project and duration	Amount sanctioned	Funding Agency
Prof. Chinmay K. Mukhopadhy	Studies on regulation of mammalian iron	Rs. 20,00,	CSIR

Name of the Investigator	Title of the project and duration	Amount sanctioned	Funding Agency
ay	transporter transferring receptor by catecholamines (2010-13)	000/-	
	Studies on the mechanism of activation of hypoxia-inducible factor-1 in <i>Leishmania donovani</i> infected macrophages and its role on intracellular growth of the parasite (2011-2013).	Rs.62,00,000/-	DBT
	Studies on the Mechanism of Activation of Hypoxia Inducible Factor-1 in <i>Leishmania Donovanii</i> Infected Macrophages and its role on Intracellular Growth of the Parasite. (2011-14).	Rs. 57,64,000/-	DBT
	Programme Support on Molecular Parasitology” to work on the project entitled “Studies on Molecular Mechanisms by which Intracellular <i>Leishmania Donovanii</i> Subverts iron pool of Host Macrophage for its Survival Advantage”, Department of Biotechnology (DBT), 2011- 2016.	Rs. 77,66,000/-	DBT

Name of the Investigator	Title of the project and duration	Amount sanctioned	Funding Agency
	Role of Brain Ferroxidases in ad and scjd Pathogenesis” in US-India Bilateral Brain Research Collaborative Partnerships (US–India BRCP) (R21) 2012- 2015.	Rs. 44,00,000/-	DBT
	Role and Regulation of Ceruloplasmin in Glial Cells in Response to Norepinephrine, 2012- 15.	Rs. 44,91,000/-	DBT
Prof. Gauranga Mukhopadhyay	Emerging Areas in Molecular Medicine (2012-2017): <b>This grant was sanctioned to him as Chairperson of SCMM.</b>	Rs.4,00,00,000/-	ICMR
Prof. Rakesh K. Tyagi	Studies to decipher the functional implications of nuclear receptors docking onto the mitotic chromatin  (2011-2014)	Rs. 21,00,000/-	CSIR
	Generation of monoclonal antibodies against a nuclear receptor ‘Pregnance & Xenobiotic Receptor’ for utility as immunological and diagnostic tool (2012-2015)	Rs. 8,80,000/-	UGC
Prof. Suman Kumar Dhar	Control of DNA replication initiation and cell cycle regulation in two important	Rs.3,37,87,200/-	DST under “Swarna jayanti

Name of the Investigator	Title of the project and duration	Amount sanctioned	Funding Agency
	human pathogens: <i>Plasmodium falciparum</i> and <i>Helicobacter pylori</i> (2009-14)		Fellowship” scheme in Biological Sciences
	Functional characterization of unique bacterial gyrase in the malaria parasite <i>Plasmodium falciparum</i> with codon optimization and screening some novel gyrase inhibitors, (2011-14).	Rs. 9,00,000/-	DBT National Biosciences Award
	“Programme Support on Molecular Parasitology” to work on the project entitled “Characterization of DNA replication and non-replication function of two putative homologues of <i>Plasmodium falciparum</i> Origin Recognition Complex”., (2011-2016).	Rs. 84,67,000/-	DBT
	Role of hypothetical protein HP0894 in DNA replication of slowly growing human pathogenic bacteria <i>Helicobacter pylori</i> . (2015-2018).	Rs. 57,00,400/-	DST

Name of the Investigator	Title of the project and duration	Amount sanctioned	Funding Agency
Prof. Vibha Tandon	Design, synthesis and biological evaluation of novel indole and 2, 3-dihydro-1 h-indence derivatives in the search of potent hiv-1 integrase inhibitors (hiv-1ini's) (2013-16).	Rs. 53,36,000/-	DST
	Development of Bisbenzimidazole as E. coli. Topoisomerase inhibitor (2012-15).	Rs. 25,00,000/-	CSIR
	Design Synthesis and Evaluation of 1,2 – dihydroisoquinolines as HIV Integrase Inhibitors (2011-13).	Rs. 8,50,000/-	DST
	Design & Synthesis of a Library of Heterocyclic Compounds and Their Biological Evaluation as Antibacterial Agents with Special References to Topoisomerase Inhibitors (2013-16).	Rs. 15,00,000/-	UGC
	DNA Topoisomerase I- Design, Synthesis and characterization of novel benzimidazoles and an insight into mechanism of selective inhibition of bacterial Topoisomerase I by these molecules.	Rs. 25,00,000/-	CSIR

Name of the Investigator	Title of the project and duration	Amount sanctioned	Funding Agency
	Duration: 2009 -2012.		
	Synthesis and characterization of modified peptide nucleic acid having pyrazolo (3, 4-d) pyrimidine as base analogues and its antisense effect (PNA) on dimerization and translational frameshifting of HIV-1Duration: 2009 - 2012.	Rs. 11,65,000/-	UGC
Prof. Gobardhan Das	Network Programme on understanding the regulatory dynamics of Tubercular granulomas through genomic and proteomic analyses: Implications for latency and re-activation (2011-2016).	Rs.1,47,69,000/(With ICGB)	DBT
	Immunotherapeutic activities of nano-curcumin in tuberculosis therapy. (2014-17)	Rs. 92,00,000/-	DBT
Dr. Saima Aijaz	A study on the mechanisms of paracellular permeability by the tight junction protein, occludin (2009-12).	Rs. 52,70,000/-	DBT
Dr. Dipankar Ghosh	Studies on the regulation of adipose tissue development	Rs. 36,80,	DBT

Name of the Investigator	Title of the project and duration	Amount sanctioned	Funding Agency
	and function by post-translational protein afinitylation (2013-16).	000/-	
<b>Grant Awarded by JNU in the year 2015</b>			
Prof. Gauranga Mukhopadhyay	Studies on Putative Cag T4SS Components CagU and CagW of <i>Helicobacter pylori</i>	Rs, 8, 80,000 /-	University with Potential of Excellence (UPE-II)
Prof. Chinmay K. Mukhopadhyay	Identification of cellular redox sensitive factors in glial and neuronal cells involved in brain iron deposition	Rs. 11,00, 000/-	
Prof. Rakesh K Tyagi	Studies on nuclear receptors as epigenetic marks in transmission of cellular transcription memory	Rs. 11,00, 000/-	
Prof. Suman K. Dhar	Understanding epigenetic regulation of transcription and DNA replication in <i>Plasmodium falciparum</i>	Rs. 15,00, 000/-	
Prof. Vibha Tandon	Development of agents for Tuberculosis Therapy and mechanistic Elucidation through Genomics and Proteomics	Rs. 11,00, 000/-	
Prof. Gobardhan Das	Development of agents for Tuberculosis Therapy and mechanistic Elucidation through Genomics and Proteomics	Rs. 11,00, 000/-	
Prof. Saima Aijaz	A study on the mechanisms of disruption of the host cell tight junction barrier in Enteropathogenic <i>E. coli</i>	Rs. 11,00, 000/-	



- Sorbonne Universités, UPMC Univ Paris 06, UMR 7238, Laboratoire de genomique des microorganismes, Paris, France.
- Institute of Microbiology, University of Lausanne and University Hospital Center, Lausanne, Switzerland.
- New Jersey Medical School, Rutgers University, United States of America.
- College of Sciences, The University of Texas at San Antonio, San Antonio, Texas.
- Virus and Prion Research Unit, National Animal Disease Center, ARS, USDA, Ames, Iowa.
- Neurology Unit, Centre for Neurodegenerative Disorders, University of Brescia, Brescia, Italy.
- Department of Pathophysiology and Transplantation, Centro Dino Ferrari, Fondazione Cà Granda, IRCCS Ospedale Maggiore Policlinico, University of Milan, Milan, Italy.

❖ **Collaborative Programmes on *Role of Iron and Oxygen in Pathobiology***

- Membrane Biology Laboratory, School of Life Sciences, Jawaharlal Nehru University, New Delhi 110067, India
- Central Research Facility, Department of Chemistry, Indian Institute of Technology, Kharagpur, Kharagpur 721302, India.
- National Brain Research Centre, Manesar, Haryana, India.
- CSIR-Institute of Microbial Technology, Sec 39A, Chandigarh, India.
- Department of Gastroenterology, GB Pant Hospital, New Delhi, India
- Department of Hepatology, Institute of Liver and Biliary Sciences, New Delhi, India
- Department of Obstetrics and Gynecology, Lady Hardinge Medical College, New Delhi, India
- Advanced Instrumentation Research Facility, Jawaharlal Nehru University, New Delhi, India
- Department of Pathology, Case Western Reserve University, Cleveland, OH 44106, USA.
- Case Western Reserve University School of Medicine, Cleveland, Ohio.
- School of Arts and Sciences, Case Western Reserve University, Cleveland, Ohio.
- University College Dublin, Ireland.
- College of Sciences, The University of Texas at San Antonio, San Antonio, Texas.
- University of Oklahoma Health Sciences Center, United States of America.

❖ **Collaborative Programmes on *Nuclear receptors in health and disease***

- School of Life Sciences, Jawaharlal Nehru University, New Delhi,
- Biochemistry Laboratory, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi 110067, India.

- Récepteurs stéroïdiens : physiopathologie endocrinienne et métabolique INSERM : U693, IFR93, Université Paris XI - Paris Sud, Faculté de médecine 63, Rue Gabriel Peri 94276 LE KREMLIN BICETRE,FR
  - IFR de Bicêtre INSERM : IFR93, Assistance publique - Hôpitaux de Paris (AP-HP), Université Paris XI - Paris Sud, Batiment Inserm Gregory Pincus PARIS XI 80, Rue du General Leclerc 94276 LE KREMLIN BICETRE CEDEX,FR.
  - Dept of Endocrinology, Metabolism & Diabetics, AIIMS, New Delhi
  - School of Computational and Integrative Sciences, JNU
  - Institute of liver & Biliary Sciences, JNU
- ❖ **Collaborative Programmes on *DNA replication in Helicobacter pylori*; *Cell cycle regulation in Plasmodium falciparum***
- School of Life Sciences, Jawaharlal Nehru University, New Delhi, India.
  - School of Computational and Integrative Sciences, Jawaharlal Nehru University, New Delhi, India.
  - Jawaharlal Nehru Centre for Advanced Scientific Research, Jakkur P.O., Bengaluru 560064, India.
  - International Centre for Genetic Engineering and Biotechnology, New Delhi, India.
  - Department of Cell and Molecular Biology, Uppsala University, Sweden.
- ❖ **Collaborative Programmes on *Chemical Biology, Medicinal Chemistry & Drug Development***
- Department of Chemistry, University of Delhi, Delhi, India
  - Department of Microbiology, University of Delhi, Delhi 110 021, India
  - Dr. Ambedkar Center for Biomedical Research, University of Delhi, Delhi, India
  - Cyclotron and Radiopharmaceutical Sciences, Institute of Nuclear Medicine and Allied Sciences, Delhi, India
  - Pharmacokinetics and Metabolism Division, Council of Scientific and Industrial Research-Central Drug Research Institute, Lucknow, India.
  - Department of Experimental Cancer Therapeutics and Chemical Biology, UM-DAE Centre for Excellence in Basic Sciences, Kalina, Mumbai 400098, India.
  - Department of Biosciences and Bioengineering, Indian Institute of Technology Bombay, Mumbai 400076, India.
  - Department of Medicinal Chemistry, Banaras Hindu University, Varanasi-221005, India
  - Syngene International Ltd, Biocon Park, Plot # 2 & 3, Phase IV, Bommasandra, Jigani Link Road, Bengaluru, India.
  - Department of Biology, Georgia State University, Atlanta, Georgia.

- Department of Chemistry & Biochemistry, CUNY–Hunter College, New York, New York 10065, United States.

❖ **Collaborative Programmes on *Infection and Immunology***

- The North Eastern Region Biotechnology Programme Management Cell, Defense Colony, New Delhi, India.
- Yogi Vemana University, Kadapa 516003, India.
- The International Centre for Genetic Engineering and Biotechnology (ICGEB), ArunaAsaf Ali Marg, New Delhi 110067, India.
- The Department of Biochemistry, University of Calcutta, 35, Ballygunge Circular Road, Kolkata 700 019, India.
- National Institute of Immunology, Aruna Asaf Ali Marg, New Delhi-110067, India.
- Department of Pathology, Microbiology & Immunology, Vanderbilt University School of Medicine, Nashville, TN 37232, USA.
- School of Laboratory Medicine and Medical Science, University of KwaZulu-Natal, Durban, 4001 South Africa.
- The Center for Tuberculosis Research, Department of Medicine, Division of Infectious Diseases, Johns Hopkins School of Medicine, Baltimore, Maryland 21231-1001.

❖ **Collaborative Programmes on *Genetically engineered biomolecules, codon-shuffling, pathogenesis of tuberculosis and dengue***

- Recombinant Gene Products Group, International Centre for Genetic Engineering and Biotechnology, ICGEB, Aruna Asaf Ali Marg, New Delhi 110067, India
- Malaria Group, International Centre for Genetic Engineering and Biotechnology, ICGEB, Aruna Asaf Ali Marg, New Delhi 110067, India.
- Department of Biotechnology, All India Institute of Medical Sciences, Ansari Nagar, New Delhi 110029, India.
- Immunology Group, International Centre for Genetic Engineering and Biotechnology, ICGEB, Aruna Asaf Ali Marg, New Delhi 110067, India.
- Innovative Life Discoveries Pvt. Ltd., IMT Manesar, Haryana, India.
- Department of Biochemistry, University of Calcutta, 35, Ballygunge Circular Road, Kolkata 700 019, India.
- School of Laboratory Medicine, College of Health Sciences, University of Kwazulu-Natal, Durban, South Africa.

❖ **Collaborative Programme on *Role of tight junctions in pathogenesis***

- Department of Cell Biology, UCL Institute of Ophthalmology, University College London, London, UK.

❖ **Collaborative Programme on Innate Immunity**

- Department of Analytical Chemistry, Faculty of Science, Regional Centre of Advanced Technologies and Materials, Palacky University, 17. listopadu 12, 771 46, Olomouc, Czech Republic.
- Institute of Microbiology, AS CR v.v.i., Videnska 1083, CZ 142 20, Prague 4, Czech Republic.

19. Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received. **UGC-SAP (DRS-II) 1.5 Cr & ICMR-CAR Project (worth 4.25 Cr.) for five years each: Total: 5.75 Cr.**

20. Research facility/centre with

- state recognition
- **national recognition**
- international recognition

21. Special research laboratories sponsored by / created by industry or corporate bodies: **Lab Equipment from ICMR-Centre Advanced Research support**

22. Publications:

\* **Number of papers published in peer-reviewed journals (national/international): 69**

\* **Monographs:** Not available

\* **Chapters in Books:** 06

\* **Edited Books:** Not available

\* **Books with ISBN with details of publishers:** 06

1. Rai R, Bhattacharya D, **Das G** (2012). Stem cells in infectious diseases. In: Roy PK. *Insight and Control of Infectious Disease in Global Scenario*. ISBN 979-953-307-497-8.

2. Deshmukh AS, Srivastava S, **Dhar SK.** (2012) *Plasmodium falciparum*: Epigenetic control of *var* gene regulation and disease. Published in the book entitled “Epigenetics: Development and Disease” for the Series: Subcellular Biochemistry. Publisher: Springer Science. ISBN 978-94-007-4524-7.
3. **RK Tyagi**, Datta A (2015) ‘Translation of Genetic Message’ ‘Textbook of Biochemistry, Biotechnology, Allied and Molecular Medicine’ Edited by GP Talwar, SE Hasnain, SK Sarin. Prentice-Hall of India Pvt. Ltd. ISBN-13: 978-8120351257.
4. **Das G**, Dwivedi V, Bhattacharya D, Yadav V (2015). Tuberculosis: An emerging threat to humanity India and elsewhere. NASI, Allahabad, India.
5. Bharati K, Bal SK, Saini S, Bhardwaj V, **Mukhopadhyay CK.** (2015) Role of Iron In Leishmania-Macrophage Interaction in ‘Leishmania: Current Biology And Control’ By Caizer Scientific Press, UK, pp-37-53, Edt By Subrata Adak And Rupak Datta. ISBN: 978-1-908230-53-9.
6. Verma V, Kumar A, **Dhar SK.** (2016) An overview of the infection, pathogenesis and molecular cell biology of DNA replication and cell division. In: Datta A and Sharma VP. *Recent Advances in Communicable and Non-Communicable Diseases.* The National Academy of Sciences, Allahabad, India (NASI). Capital Publishing Company, New Delhi, India. ISBN: 978-93-81891-31-5.

\* **Number listed in International Database (For eg. Web of Science, Scopus, Humanities International Complete, Dare Database-International Social Sciences Directory, EBSCO host, etc.):** Web of Science, Scopus, MEDLINE, PUBMED.

\* **Citation Index-range/average:**

Sl. No.	Name of Faculty	Publication Citation Index-range/average
1.	Prof. Gauranga Mukhopadhyay	669
2.	Prof. Chinmay K Mukhopadhyay	1778
3.	Prof. Rakesh K Tyagi	1220
4.	Prof. Suman K Dhar	1820
5.	Prof. Vibha Tandon	1681

6.	Prof. Gobardhan Das	1663
7.	Dr. Anand Ranganathan	217
8.	Dr. Souvik Bhattacharjee	824
9.	Dr.Shailja Singh	1100
10.	Dr. Saima Aijaz	634
11.	Dr. Dipankar Ghosh	1149

\* **SNIP:**

\* **SJR:**

\* **Impact Factor-range/average:** 2.0-7.0 / 5.0

\* **h-index:**

Sl. No.	Name of Faculty	h- index
1.	Prof. Gauranga Mukhopadhyay	19
2.	Prof. Chinmay K Mukhopadhyay	23
3.	Prof. Rakesh K Tyagi	17
4.	Prof. Suman K Dhar	18
5.	Prof. Vibha Tandon	21
6.	Prof. Gobardhan Das	21
7.	Dr. Anand Ranganathan	08
8.	Dr. Souvik Bhattacharjee	09
9.	Dr.Shailja Singh	14
10.	Dr. Saima Aijaz	09
11.	Dr. Dipankar Ghosh	07

23. Details of patents and income generated: **From Research Projects funds only**

**List of patents**

- **Dhar SK**, Dana S, Prusty D, Dar A and Mukhopadhyay P. Acriflavin (ACF) as an anti-malarial agent. Indian patent filed IPM cell at JNU, New Delhi. Application No. 2630/DEL/2012.
- **SK Dhar et. al.** “Method of screening anti-Plasmodial activity of acriflavin as an antimalarial agent”. International patent filed PCT/IN2013/000411 and USA Patent US 9375426 B2, 2016.
- **V. Tandon et. al.** “Broad spectrum antibacterial activity of novel bisbenzimidazoles targeting topoisomerase 1A and Synergistic composition of Bisbenzimidazole with Efflux Pump Inhibitors against pathogenic bacteria”. Indian Patent Application no. 201611002627, 23/01/2016.
- **V. Tandon et. al.** “Broad spectrum antibacterial activity of novel bisbenzimidazoles targeting topoisomerase 1A and Synergistic composition of Bisbenzimidazole with Efflux Pump Inhibitors against pathogenic bacteria”. Indian Patent Application no. 201611002627, 23/01/2016.
- **V. Tandon et. al.** Canadian Patent No: 2,937,241 “DMA, a bis-benzimidazole, confers radioprotection to the intestine via AKT/NFKB dual pathway activation”  
Date of Filing: 2016/07/27.
- **V. Tandon et. al.** USA Patent No:15/220631 “DMA, a bis-benzimidazole, confers radioprotection to the intestine via AKT/NFKB dual pathway activation”  
Date of Filing: 2016/06/27.

24. Areas of consultancy and income generated: N/A

25. Faculty selected nationally / internationally to visit other laboratories/institutions / industries in India and abroad: **See the details below**

- **Prof. R.K. Tyagi** delivered Inaugural Lecture entitled ‘Eradication of cellular transcription memory by endocrine disruptors and therapeutic drugs targeting nuclear receptors’ at National Workshop on techniques in animal cell culture and *in vitro* toxicology, Mahatama Gandhi Doerenkamp Centre for Alternative use of Animals in Life Science, Bharathidasan University, Tiruchirapalli on 24 Dec, 2011-3 Jan, 2012.
- **Prof. R.K. Tyagi** delivered a lecture entitled ‘Introduction to DNA transfection methods for mammalian cells’ at National Workshop on techniques in animal cell culture and *in vitro* toxicology, Mahatama Gandhi Doerenkamp Centre for

Alternative use of Animals in Life Science, Bharathidasan University, Tiruchirapalli during 24 Dec 2011 - 3 Jan 2012.

- **Prof. R.K. Tyagi** chaired a session at the National Conference on the ‘Novel Aspects and Emerging Trends in Reproduction and Endocrinology’ and 30<sup>th</sup> National Meeting of the ‘Society for Reproductive Biology and Comparative Endocrinology’ at MS Sukhadia University, Udaipur, Rajasthan during 30 Jan-1 Feb 2012.
- **Prof. R.K. Tyagi** chaired a session on ‘Stem Cells and Regenerative Medicine’ during ‘Biotech-2012’ Annual Conference on ‘Current Advances in Biotechnology and Medicine’ at Institute of Liver and Biliary Sciences, New Delhi during 24-25 February 2012.
- **Prof. S. K. Dhar** chaired a scientific session during the International Meeting on Amebiasis jointly organised by EMBO and INSA during 2-3 March 2012.
- **Prof. S. K. Dhar** delivered a lecture as a mentor during Ramalingaswami Fellows’ meeting organised by Department of Biotechnology held at Hyderabad during 11-14 April 2012.
- **Prof. C.K. Mukhopadhyay** delivered a talk on ‘Role of Iron in Metabolic Diseases’ in Jamia Milia Islamia University May 12, 2012.
- **Prof. C.K. Mukhopadhyay** delivered a talk on ‘Regulation of hypoxia inducible factor-1 by insulin: implication in iron homeostasis’ in Global Hypoxia Summit & 4<sup>th</sup> International Conference on Chronic Hypoxia conducted at Delhi from 9-12 August 2012.
- **Dr. Saima Aijaz** delivered 3 lectures at the National Brain Research Centre (NBRC), Manesar, Haryana from October 11-18, 2012.
- **Prof. C.K. Mukhopadhyay** delivered a talk on ‘*Leishmania donovani*: The master of mining iron’ in 5<sup>th</sup> Annual Meeting of The Cytometry Society at Kolkata during 12-13 Oct 2012.
- **Prof. R.K. Tyagi** delivered an invited lecture ‘Docking of nuclear receptor onto the mitotic chromosomes: a mystery paving way for a future challenge’ at the 81<sup>st</sup> Annual meeting of the Society of Biological Chemists, Indian Institute of Chemical Biology, Kolkata, 8-11 November 2012.
- **Prof. R.K. Tyagi** delivered an invited lecture on ‘Transcription Memory: a new dimension to emergence of nuclear hormone receptor mediated malignancy’ at the Symposium on ‘Emerging Trends and Molecular Diagnostics in Cancer and Therapeutics’ organized by Indian Association for Cancer Research (IACR) held at All India Institute of Sciences (AIIMS) on December 8, 2012.
- **Prof. C.K. Mukhopadhyay** delivered a talk on ‘Role of multicopper oxidase in iron uptake and virulence of *Leishmania donovani*’ in BIOWORLD 2012: Proteins in Disease and Disorder in IIT Delhi during 10-12 Dec 2012.
- **Prof. S.K. Dhar** was invited as a speaker to attend Gordon Research Conference on Host-Parasite Biology held at Rhode Island, USA, 2012.

- **Prof. C.K. Mukhopadhyay** delivered a talk on ‘Normoxic regulation of Hypoxia Inducible Factor-1: A proangiogenic transcription factor’ in International Symposium on Transcription and Cancer in the Department of Biochemistry, University of Calcutta on Jan 8, 2013.
- **Prof. C.K. Mukhopadhyay** delivered a talk on ‘*Leishmania donovani*: The master of mining iron’ in ‘Biosparks’, School of Life Sciences, Jawaharlal Nehru University on Feb 16, 2013.
- **Prof. R.K. Tyagi** delivered an invited lecture entitled ‘Inheritance of active transcription memory by cells: evidence from ligand-modulated transcription factors’ at the International Symposium on Molecular Signalling’ held at Visva Bharati University, Santiniketan during 18-21 February 2013
- **Prof. C.K. Mukhopadhyay** delivered a talk on ‘Glutathione depletion regulates iron transport component ceruloplasmin by dual but opposite mechanism: Implication in hepatic iron overload’ in Genomeet-2013 in CSIR-IGIB, New Delhi on 8-11 March 2013.
- **Prof. C.K. Mukhopadhyay** delivered a talk on “Role of iron in *Leishmania*-macrophage interaction” in Jamia Milia Islamia University, New Delhi, May 18, 2013.
- **Prof. C.K. Mukhopadhyay** delivered a talk in “Frontiers in Modern Biology-2013”, Department of Biochemistry, Indian Institute of Science, Bangalore, 15-16 June 2013.
- **Prof. R.K. Tyagi** delivered an invited lecture on ‘Inheritance and erosion of active transcription memory by cells: evidence from ligand-modulated transcription factors’ at the National Symposium on ‘Impact of Endocrine disruptor on Reproductive Health” held at the All India Institute of Sciences (AIIMS), New Delhi on July 20, 2013.
- **Prof. C.K. Mukhopadhyay** participated and delivered a talk in SYSCON-2013 organised by All India Institute of Medical Sciences, August 23, 2013.
- **Prof. S.K. Dhar** delivered a lecture for a two-day seminar series on “New Horizons in Biotechnology” at Haldia Institute of Technology, 29-30 Aug 2013.
- **Prof. R.K. Tyagi** delivered an invited lecture entitled “The concept of ‘Cellular Transcription Memory’ unveils a novel mechanism of emergence of steroid/nuclear receptor-mediated malignancies” at the International Conference on Recent Advances in ‘Cancer Prevention and Therapeutics’ at Central University of Gujarat, Gandhinagar, 19-21 Nov 2013.
- **Prof. R.K. Tyagi** chaired Session 5 on “ Novel Strategies and Mechanisms in Cancer Chemoprevention” at the International Conference on Recent Advances in ‘Cancer Prevention and Therapeutics’ at Central University of Gujarat, Gandhinagar, 19-21 Nov 2013.
- **Prof. S.K. Dhar** delivered a lecture for International Scientific Workshop “Recent Developments in Malaria Parasite Biology” organised by ICGEB, New Delhi, 2-4 Dec, 2013.

- **Prof. S.K. Dhar** delivered a lecture in the National Workshop entitled “Use of Recombinant DNA Technology” at the National Institute of Technology, Durgapur, 17-21 Dec, 2013.
- **Prof. Vibha Tandon** delivered an invited talk on “DMA a bisbenzimidazole: An Odyssey of a Small Molecule as Radioprotectant” at the 20<sup>th</sup> International Society of Chemistry and Biology Conference, University of Delhi, New Delhi, March 4, 2014.
- **Prof. C.K. Mukhopadhyay** delivered a talk in “Recent Trends in International Hypoxia Research”, Indian Institute of Technology, New Delhi, March 6, 2014.
- **Prof. R.K. Tyagi** chaired a session (VII) at the Conference by the International Society for Heart Research held at Convention Centre, JNU, New Delhi during 14-15 March 2015
- **Prof. Vibha Tandon** delivered an invited talk on “An Odyssey of Cytoprotective Bisbenzimidazole as Therapeutic Agent for Human Well-Being” at BioSpark-2014 held at School of Life Sciences, JNU, March 21, 2014.
- **Prof. R.K. Tyagi** chaired Session IV during the Second National Conference of ASC-JNU Alumni, ASCALCON-2014 at Academic Staff College, 24-28 March 2014.
- **Prof. Vibha Tandon** delivered an invited talk entitled “Novel Bisbenzimidazole a potential Radioprotector Mitigates DNA Damage in Radiotherapy” at SFRR-2014 organised by Society for Free Radical Research at BARC, Mumbai, March 27, 2014
- **Prof. R.K. Tyagi** delivered an invited lecture entitled “ Cellular Transcription Memory: Nuclear Receptors as Epigenetic Marks” at the ‘National Seminar on Recent Trends in Biology’ organised by the Department of Zoology, University of Pune, 28-29 March 2014.
- **Prof. R.K. Tyagi** delivered two talks on ‘Nuclear Receptors’ at the Department of Animal Biotechnology, Lala Lajpat Rai University of Veterinary & Animal Sciences (LUVAS), Hisar, Haryana, March 31, 2014.
- **Prof. Vibha Tandon** attended a “Workshop on Gender Based Violence and Law” held at JNU, New Delhi, 11-12 April 2014.
- **Prof. Vibha Tandon**, Invited talk on Bisbenzimidazole as Therapeutic Agent for Human Well-Being at Jaypee Hotel, in International Conference of XIV National Organic Symposium Trust - 2014 on April 6, 2014.
- **Prof. S.K. Dhar** delivered a lecture during International Conference on Host-Pathogen Interactions (ICHPI) organised by The National Institute of Animal Biotechnology (NIAB) along with University of Hyderabad, held in Hyderabad, July 12-15, 2014.
- **Prof. S.K. Dhar** delivered a lecture during “Humboldt Kolleg-2014” organised by The Alexander von Humboldt (AvH) Association, Bangalore, in association with the AvH-Stiftung, Bonn, Germany, held in Bangalore, September 4-6, 2014.

- **Prof. Vibha Tandon**, Invited Special Lecture at Sensitization Meeting of Women Scientist Scheme of DST at Sophitorium Institute of Technology, Bhubaneswar during September 13, 2014.
- **Prof. R.K. Tyagi** chaired a scientific session (Session 6) at the Fifth International Conference on Stem Cells and Cancer (ICSCC-2014): Proliferation, Differentiation and Apoptosis at JNU Convention Centre, New Delhi, 8-10 November 2014.
- **Prof. Vibha Tandon**, Invited Talk on “DMA; A Novel Bisbenzimidazole Confers Protection Against Ionizing Radiation through PTEN/AKT/NFκB” in an International Conference of Radiation Biology 2014; Frontiers in Radiobiology: Immunomodulation, Countermeasures & Therapeutics; 12th Biennial Meeting of Indian Society for Radiation Biology (ISRB) during SILVER JUBILEE YEAR of ISRB New Delhi, organized by INMAS from 12-15 Nov, 2014.
- **Prof. S.K. Dhar** delivered a lecture during “National Symposium on Genetic Analysis: Translational and Developmental NSGTD) and Annual Meeting of Society of Biotechnologists (India)” held at The University of Burdwan, Nov 21-23, 2014.
- **Prof. Vibha Tandon**, Invited talk on Bisbenzimidazole as Therapeutic Agent for Human Well-Being at DDNPTM an International Conference organised by NIPER Chandigarh at NIPER, 21-24 November 2015.
- **Prof. R.K. Tyagi** delivered an invited lecture entitled ‘Cellular Transcriptional Memory: Nuclear Receptors as Epigenetic Marks’ at a Symposium on ‘Recent Trends in Molecular Medicine, organised by Centre for Genetic Diseases and Molecular Medicine, Central University of Punjab (CUPB), Bathinda on December 5, 2014.
- **Prof. Vibha Tandon**, Invited talk on Bisbenzimidazole as Therapeutic Agent for Human Well-Being; Annual Convention of Chemist, Indian Chemical Society Meeting, Kurukshetra University, Kurukshetra, 9-12 December’ 2014.
- **Prof. S.K. Dhar** delivered a lecture during Bio World 2014, held at the Indian Institute of Technology, New Delhi, Dec 12-14, 2014.
- **Tyagi, R.K.**, Chaired a session at the International Symposium on Molecular Signalling: *Recent Trends in Biomedical and Translational Research* at IIT-Roorkee from 17-19 December 2014 jointly organised by IIT-Roorkee, National Institute of Immunology (NII) and Jawaharlal Nehru University (New Delhi).
- **Prof. Vibha Tandon**, Invited talk on Co-activation of AKT/NF-κB triggered by DMA, a Bisbenzimidazole Confers Protection against Ionizing Radiation-Induced Apoptosis; International Conference on Molecular Signaling: Recent Trends in

Biomedical and Translational Re-search” scheduled from 17-19 December 2014 organised by Indian Institute of Technology Roorkee.

- **Prof. Vibha Tandon**, Invited talk on Bisbenzimidazole as Therapeutic Agent for Human Well Being at Rajguru College, Delhi University on 30th December in a National Conference, UMCCD-2014.
- **Prof. C.K. Mukhopadhyay**, The Indo-French collaboration in Biomedical Research; ILBS, New Delhi, 16-18 Jan 2015.
- **Mukhopadhyay CK** delivered a talk on ‘Regulation of iron homeostasis by Catecholamines’ in The Indo-French collaboration in Biomedical Research; ILBS, New Delhi, 16-18 Jan 2015
- **Prof. S.K. Dhar** delivered a lecture during International Workshop on Discovery of Drugs against Malaria held in ICGEB, New Delhi, Jan 27-Feb 3, 2015.
- **Prof. S.K. Dhar** delivered a keynote lecture during one day National Symposium on “Human health and diseases” held at the Dept. of Zoology, University of Calcutta, Jan 31, 2015.
- **Prof. S.K. Dhar** delivered a lecture during "Interdisciplinary approach to biological sciences (IABS-2015)" held at the Indian Association for the Cultivation of Science, Kolkata, India, 2-3 February 2015.
- **Prof. S.K. Dhar** delivered a lecture during “1<sup>st</sup> International Conference on Translational Research: From Basic Science to Clinical Application” held at KIIT University, Bhubaneswar, 5-7 February 2015.
- **Prof. Vibha Tandon**, Invited talk on “Novel Smart C<sub>2</sub>-Symmetrical NDI Derivatives as G-Quadruplex Stabilizing Ligand with a Potential to Differentiate between Topological Structures” from 17-20<sup>th</sup> February 2015 at National Symposium on Biophysics and Golden Jubilee meeting of the Indian Biophysical Society held at Jamia Milia Islamia, New Delhi February 14-17, 2015.
- **Prof. Vibha Tandon**, Invited talk on “Activation of PTEN/Akt/ TNF $\alpha$ /NF $\kappa$ B pathway triggered by DMA, a Bis Benzimidazole provides protection against Ionizing” at International Symposium on Current Advances in Radiobiology, Stem Cells and Cancer Research held at School of Life Sciences, Jawaharlal Nehru University, New Delhi, February 19-21, 2015.
- **Mukhopadhyay CK** delivers a talk on ‘Role and regulation of ceruloplasmin in glial cells in response to norepinephrine’ for National Initiative on Glial Cell Research in Health and Disease held in NBRC, Manesar, on Feb 22, 2015.
- **Prof. Vibha Tandon**, Invited talk on “Odyssey of Bisbenzimidazole as Therapeutic Agent for Human Well Being” at Faculty Development Program (FDP) entitled “Next Generation Drugs and Drug Delivery Systems: Future

Prospective” at Chandigarh College of Pharmacy, Landran, Mohali, Chandigarh on 11 March 2015.

- **Prof. Gobardhan Das** at World Tuberculosis Day held at All India Institute of Medical Sciences, March 23, 2015.
- **Prof. R.K. Tyagi** delivered an invited talk entitled “Cellular Transcriptional Memory: Nuclear Receptors as Epigenetic Marks’ at the ‘International Conference on Molecular Signalling: Recent Trends in Biosciences’ at North-East Hill University, Shillong during 20-22 November 2015.
- **Prof. R.K. Tyagi** delivered an invited lecture entitled ‘Nuclear Receptors as Epigenetic Marks in Transcriptional Memory’ at the 15<sup>th</sup> Annual Convention of the Indian Society of Veterinary Pharmacology and Toxicology (ISVPT) on the theme “Nutritional Pharmacology and Toxicology beyond Calories” at the National Dairy Research Institute (NDRI), Karnal during 14-16 January, 2016.
- **Prof. R.K. Tyagi** delivered a Plenary Lecture entitled ‘Inheritance of Cellular Transcriptional Memory: Nuclear Receptors as Epigenetic Marks’ at the International Symposium on Integrative Physiology and Comparative Endocrinology’ and the 34<sup>th</sup> Meeting of SRBCE held at Banaras Hindu University, Varanasi during 12-14 February 2016.
- **Prof. R.K. Tyagi** delivered an invited lecture entitled ‘Nuclear Receptors as Epigenetic Marks in Inheritance of Cellular Transcription Memory: Consequence of Memory Erosion by Endocrine Disrupting Chemicals’ during UGC-CAS sponsored one day National Symposium organised by Department of Zoology at Savitribai Phule Pune University, Pune on March 28, 2016.
- **Dr. Souvik Bhattacharjee**, invited for participation in Gordon Research Conference and Seminar series on The Biology of Host-Parasite Interactions, at Salve Regina University, New Hampshire, USA, June 11-17, 2016.
- **Prof. Gobardhan Das** at National Symposium on Translational Research (Bhubaneswar), M.P.
- **Prof. Gobardhan Das** at International Immunology day (THSTI, Faridabad)
- **Prof. Gobardhan Das** at Indian Institute of Chemical Technology (Hyderabad)
- **Prof. Gobardhan Das** at University of Texas, Houston, USA
- **Prof. Gobardhan Das** University of Texas, Tyler, USA
- **Prof. Gobardhan Das** University of Kwazulu Natal, Durban, South Africa

26. Faculty serving in

- a. National committees b) International committees c) Editorial Boards d) any other (please specify)

- **Prof. C.K. Mukhopadhyay**; Editorial Board Member, Scientific Reports (Nature Publication Group)- 2013; Guest Editor-PLoS Pathogen
- **Prof. Suman K. Dhar**; SERB PAC Member for Biochemical Biophysics & Molecular Biology & Microbiology.
- **Prof. Vibha Tandon**; (a) Appointed Chairman of Subject Expert Committee, DST-WOS-A in Chemical Sciences for 2016-19; (b) Appointed member of CURIE-DST Programme, for 3 years; (c) A reviewer for the Indian Journal of Experimental Biology.

27. Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs).

**The SCMM faculties have been continuously participating in workshops/training programmes in National & International conferences in order to update about latest research in their subject areas as well as to learn novel scientific techniques/ instruments.**

28. Student projects

- Percentage of students who have done in-house projects including inter-departmental projects: **100%: Our M.Sc. students work at different research laboratories in Centre in order to get trained on various experimental techniques.**
- percentage of students doing projects in collaboration with other universities / industry / institute: **Nil**

29. Awards/recognitions received at the national and international level by

- Faculty

<b>Prof. Chinmay K. Mukhopadhyay</b>	<ul style="list-style-type: none"> <li>• 2013- Elected Fellow, National Academy of Sciences, India</li> <li>• 2013-Elected fellow, National Academy of Sciences, India.2016-President Award for Research on Molecular Parasitology.</li> </ul>
<b>Prof. Suman Kumar Dhar</b>	<ul style="list-style-type: none"> <li>• 2011-Elected fellow, National Academy of Sciences, India.</li> <li>• 2012 -Invited as a speaker to attend Gordon Research Conference on Host-Parasite Biology to be held at Rhode Island, USA.</li> <li>• 2012 - Shanti Swarup Bhatnagar Award in the Biological Sciences.</li> <li>• 2015- Elected Fellow, Indian National Science Academy, Bangalore, India.</li> <li>• 2015 Elected Fellow, Indian National Science Academy,</li> </ul>

	<p>New Delhi, India.</p> <ul style="list-style-type: none"> <li>• 2016-President Award for Research on Molecular Parasitology.</li> </ul>
<b>Prof. Vibha Tandon</b>	<ul style="list-style-type: none"> <li>• 2012, at Radiation Research laboratory of Prof. George Iliakis, Director, Essen Medical School, Germany under DST –DAAD Program.</li> <li>• 2013-Fulbright Fellowship to, work at Georgia State University, Atlanta, USA in the laboratory of Prof. Ritu Aneja, Department of Biology.</li> <li>• Member of National Academy of Sciences India, Allahabad.</li> <li>• A member of the committee of University of Delhi, which was coordinating the visit of UGC Xth Plan Committee in Delhi University.</li> </ul>
<b>Prof. Gobardhan Das</b>	<ul style="list-style-type: none"> <li>• 2013 - NRF rating, South African Science and Technology.</li> <li>• 2015 - Honorary Professor, University of Texas, Houston.</li> <li>• 2015-Adjunct Professor, Univ. of Kwazulu Natal, Durban, SA.</li> <li>• 2015 - Honorary Professor, University of Technology, Sydney.</li> </ul>

- Doctoral/post doctoral fellows: N/A
- **Students**
- **Navin Kumar** won best poster award in National Symposium on “Microbes in Health and Agriculture” held on 12-13 March 2012, School of Life Science, Jawaharlal Nehru University, New Delhi-67
- **Abhijit S. Deshmukh** won First Prize in Oral presentation category in the 10th Biosparks meeting organised by School of Life Sciences, Jawaharlal Nehru University, New Delhi India. 14-15 March 2012.
- **Priyanka** won third prize on oral presentation in 10th Annual Research Festival “Biosparks 2012”. School of Life Sciences, Jawaharlal Nehru University, New Delhi, India. 14-15 March 2012.
- **Manjul Rana** won the Best Poster award in 30<sup>th</sup> Annual Symposium of the Society for Reproductive Biology and Comparative Endocrinology held at Mohanlal Sukhadia University, Rajasthan between 30th January to 1st February 2012.
- **Seema Negi** winner of Prof. N. J. Chinoy Award for the best poster at the National Conference on 'Novel Aspects and Emerging Trends in Reproduction and Endocrinology' and the 30th Annual Symposium of SRBCE-2012.

- **Som Dev** won the best poster award in 82<sup>nd</sup> Annual Meeting of The SBC (I) and International Conference on Genome: Mechanism and Function held at School of Life Science, University of Hyderabad in December 2013.
- **Pallavi Lahiri** won the best poster award in “Indo-US Symposium on Mass Spectrometry-based Metabolomics in Disease Biology” held at RGCB, Thiruvananthapuram, Kerala, India in Jan 2014.
- **Som Dev**, received best virtual thesis award in the 2<sup>nd</sup> EAW Intensive Summer Programme, "From Symposium to Thesis Writing" held at Jawaharlal Nehru University, New Delhi from 1st May - 10th May 2014.
- **Rajesh Kumari**, a Ph.D. student of the Centre, was awarded fellowship to visit Research Centre for Infectious Disease (ZIBF) of the University of Wurzburg, Germany from 3<sup>rd</sup> November 2014 to 31<sup>st</sup> January 2015, under the DAAD Programme entitled “A passage to India”.
- **Sandhya**, received best poster award in ‘Parasitology 2015’ - a conference on recent trends in Parasitology held at Convention Centre, JNU, New Delhi from 20-21 March 2015.
- **Shashi Kala Singh** won the second best poster award in Society for Reproductive Biology and Comparative Endocrinology held at Banaras Hindu University, Varanasi from 12-14 February 2016.
- **Rahul Sharma** attended International Conference on “Experimental Biology’ 2015” held at Boston Convention Centre, Boston, USA from 28<sup>th</sup> March, 2015-1<sup>st</sup> April 2015.
- **Priyanka** participated and presented poster in Cell Symposia entitled “Transcriptional Regulation in Development and Disease” held at Feinberg Conference Center, Northwestern Memorial Hospital, Chicago, Illinois, USA in June 2016.

30. Seminars/ Conferences/Workshops organised and the source of funding (national / international) with details of outstanding participants, if any.

- **Sixth Symposium on “Frontiers in Molecular Medicine”** was organised by the Special Centre for Molecular Medicine in the Convention Centre, JNU on 13–14 February 2015. The organisation of the said symposium was coordinated by Prof. C.K. Mukhopadhyay and all existing faculty members of the Centre were jointly involved in the organisation of this event.

Prof. Shiv Kumar Sarin, Director, ILBS, New Delhi has delivered the scheduled special Lecture on ‘Molecular Medicine’ entitled “Liver regeneration in a healthy and diseased liver”.

The following two Memorial Lectures were delivered by very distinguished scientists.

- **B.K. Bachhawat Memorial Lecture** Entitled ‘Mycobacterium tuberculosis: A pathogen that refuses to be tamed’ by Prof Anil K. Tyagi, Vice Chancellor, GGSIPU, New Delhi.
- **V. Ramalingaswami Memorial Lecture** entitled “Molecular heterogeneity and tumour behaviour: A window through primary human gliomas” by Prof. Subrata Sinha, Director, NBRC, Manesar, Gurgaon.

In the various sessions of symposium, young and renowned scientists from various reputed institutes of India delivered talks on their most exciting recent findings in the areas of Molecular Medicine i.e. Infectious Diseases, Chemical Biology, Reproduction Biology & Endocrinology & metabolic diseases.

**A POSTER PRESENTATION SESSION FOR SCMM STUDENTS** was also arranged wherein most of the SCMM Ph.D. students have presented their research works before the invited speakers, Scientists & researchers.

In the last day of the symposium,

- **5<sup>th</sup> “Prof. P. N. Srivastava Endowment Lecture”** delivered by Prof. Vijay Raghwan, Secretary, Department of Biotechnology, New Delhi organised by the Special Centre for Molecular Medicine in the JNU Convention Centre on 4<sup>th</sup> April’ 2014.
- A Hands-on workshop on “*Molecular Biology Techniques in Health & Medical Sciences*” was Organised during 11-12<sup>th</sup> February ’2015 at SCMM to give a hands-on-training in the state of the art Molecular/Cell Biology techniques relevant to the areas of Molecular Medicine. This workshop was funded by ICMR-CAR. This workshop was focused on NGS and Fluorescent Microscopy in which participants were MBBS from different medical colleges of India. Out of a total of 170 applicants, ten (10) applicants were selected. All the candidates were from Medical Sciences background (MBBS/MD/MVSc).

The areas covered for the training included

- Next Generation Sequencing (NGS),
  - PCR Techniques,
  - Fluorescence and Confocal Microscopy in health and diseases.
- A workshop on “Computational Methods in Drug Discovery” from 9<sup>th</sup> - 11<sup>th</sup> August ’2016 at Special Centre for Molecular Medicine (SCMM), JNU in

collaboration with School of Computational and Integrative Sciences (SCIS, JNU).

31. Code of ethics for research followed by the departments: **All the research proposals placed before the Ethical Committee of the University**

32. Student profile programme-wise:

Name of the Programme (Refer to question no.)	Applications received/ (in 2 yrs only)	Selected		Pass percentage	
		Male	Female	Male	Female
<b>Integrated M.Sc.-Ph.D. Programme</b>	1850/56 (in 2 yrs only)	05	07	42%	<b>58%</b>
<b>Pre-Ph.D. Programme (Through Entrance Test)</b>	4000/120 (in 2 yrs)	11	20	36%	<b>64%</b>
<b>Pre-Ph.D. Programme (Through NET-JRF)</b>	30/27 (in 2016-17)	02	--	100%	--
<b>Direct Ph.D.</b>	<b>80/60</b> (in 4 yrs)	<b>05</b>	<b>03</b>	<b>62.5%</b>	<b>37.5%</b>

33. Diversity of students

Name of the Programme (refer to question no. 4)	% of students from the same university	% of from other universities within the State	% of from universities outside the State	% of students from other countries
<b>M.Sc.</b>	--	2	9	--
<b>Ph.D.</b>	<b>17</b>	<b>13</b>	<b>35</b>	<b>1</b>

34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise. **NET Qualified=50, GATE Qualified = 30**

35. Student progression

Student progression	Percentage against enrolled
<b>UG to PG</b>	<b>N/A</b>

<b>PG to M.Phil.</b>	<b>N/A</b>
<b>PG to Ph.D.</b>	<b>N/A</b>
<b>Ph.D. to Post-Doctoral</b>	<b>100%</b>
<b>Employed Campus selection</b>	<b>100% in other than campus recruitment</b>
<b>Entrepreneurs</b>	

36. Diversity of staff

<b>Percentage of faculty who are graduates</b>	
<b>of the same university</b>	<b>01</b>
<b>from other universities within the State</b>	<b>02</b>
<b>from universities from other States</b>	<b>08</b>
<b>from universities outside the country</b>	<b>Nil</b>

37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period: **Nil**

38. Present details of departmental infrastructural facilities with regard to

a. Library: **01**

b. Internet facilities for staff and students: **Each faculty has two internet connection and office and library have four each internet connections, committee room and seminar halls have one internet connection.**

c. Total number of class rooms: **02**

d. Class rooms with ICT facility: **None**

e. Students' laboratories: **05 (CIFs, Imaging room , M.Sc., FACS, Culture rooms)**

f. Research laboratories: **12**

39. List of doctoral, post-doctoral students and Research Associates

a. from the host institution/university: **01**

S. No.	Name of the Post Doc Fellow	Date of Joining	From
1.	Dr. Paramita Saha	25/02/2016	From SES, JNU as Young Scientist (SERB-DST)

b. from other institutions/universities:

S. No.	Name of the Post Doc Fellow	Date of Joining	From
1.	Dr. Rajiv Kumar	25/04/2014	AIIMS, New Delhi
2.	Dr. Prerna Bali	11/08/2014	NIMR, Delhi
3.	Dr. Md. Zahid Kamran	10/04/2015	Tata Memorial Centre (ACTREC) Mumbai
4.	Dr. Mradul Mohan	17/08/2015	CDRI, Lucknow
5.	Dr. Sunita Yadav	29/02/2016	CDRI, Lucknow
6.	Dr. Priyanka Bajaj	1/04/2016	University of Delhi, South Campus
7.	Dr. Pawan Kumar	25/04/2016	NII, New Delhi
8.	Dr. Sonal Gupta	1/10/2016	Shiv Nadar University
9.	Dr. Amandeep Kaur Kahlon	3/10/2016	CIMAP, Lucknow
10.	Dr. Jhalak Singhal	27/10/2016	University of Delhi
11.	Dr. Abhishek	4/11/2016	University of Delhi

S. No.	Name of the Post Doc Fellow	Date of Joining	From
	Mukherjee		
12.	Dr. Ruchir Rastogi	25/08/2015	University of Kalyani
13.	Dr. Debapriya Bhattacharya	15/10/2015	Shanti Niketan, Kolkata

40. Number of post graduate students getting financial assistance from the university.  
**About 15 students have availed the financial assistance from JNU Corpus funds of the university**

41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.

**The course of Integrated M.Sc. Ph.D. Programme in Molecular Medicine was developed by inviting subject experts from AIIMS, NII, ICGEB, THSTI, Delhi University and convening several brain storming sessions between scientists / experts from above institutions. The complete course was further discussed in Special Committee of SCMM and modified as per suggestions of members. The said course was finally approved by Academic Council of the University.**

42. Does the department obtain feedback from

p. Faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilise the feedback?

**Faculty members discuss their feedback through Faculty Committee Special Committee meetings.**

q. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilise the feedback?

**Students give their feedback through Students Faculty Committee, Special Committee meetings.**

r. Alumni and employers on the programmes offered and how does the

department utilise the feedback?: N/A

43. List the distinguished alumni of the Department (maximum 10): Nil
44. Give details of student enrichment programmes (special lectures/workshops / seminar) involving external experts.

### **SEMINARS BY EXTERNAL EXPERTS**

- **Dr. Durba Mukhopadhyay**, Department of Biology, Cuyahoga Community College, Ohio, USA.
- **Dr. Vivek Rai**, Department of Medicine, New York University Medical Center, USA.
- **Dr. Dhruv K. Sethi**, Dana-Farber Cancer Institute & Harvard Medical School Boston, MA, USA.
- **Dr. Akash Gulyani**, Department of Pharmacology, University of North Carolina, U.S.A.
- **Prof. Amitabha Chattopadhyay** CCMB, Hyderabad.
- **Dr. Tapas K. Kundu** from Transcription and Disease Laboratory, Molecular Biology and Genetics Unit Jawaharlal Nehru Centre for Advanced Scientific Research, Jakkur, Bangalore.
- **Dr. Dibyendu Bhattacharya**, Tata Memorial Centre, ACTREC, Navi Mumbai.
- **Prof. Sudhanshu Vрати, Dean**, Translational Health Sciences and Technology Institute HSTI, Gurgaon.
- **Prof. Mohd. Iqbal Choudhary** and his colleagues from Dr. Panjwani Centre for Molecular Medicine and Drug Research & International Centre for Chemical & Biological Sciences, Univ. of Karachi, Pakistan.
- **Prof. Meena K. Sakharkar**, University of Tsukuba, Tsukuba, Japan.
- **Prof. Ravindra N. Singh**, Department of Biomedical Sciences, College of Veterinary Medicine Iowa State University, USA.
- **Dr. Shantanu Raychaudhuri**, School of Medicine, UCLA, Los Angelis.
- **Dr. Bandana Chatterjee**, Department of Molecular Medicine, University of Texas, USA.
- **Dr. Koyeli Mapa**, CSIR-IGIB, New Delhi.
- **Dr. Supriya G. Prasanth**, Department of Cell and Developmental Biology, University of Illinois at Urbana-Champaign, USA.
- **Prof. Aleem Siddiqui**, Department of Medicine, Division of Infectious, Diseases, University of California, USA.

- **Dr. Babal K. Jha**, Department of Cancer Biology Lerner Research Institute Cleveland Clinic, USA.
- **Dr. Jean Rosenbaum**, INSERM, University of Bordeaux Segalen, France.
- **Prof. Vijay Raghavan**, Secretary, Department of Biotechnology, New Delhi – delivered 5<sup>th</sup> “Prof. P. N. Srivastava Endowment Lecture”.
- **Prof. Krishnaswamy Kasturirangan**, *honourable Chancellor of the University*.
- **Prof. V. S. Chauhan**, Director, ICGEB, New Delhi.
- **Dr. Nil & Dr. Ong**, Eppendorf AG, Germany.
- **Prof. Dev P. Arya**, Clemson Univesity, USA.
- **Prof. Anil K. Tyagi**, Vice Chancellor, Guru Gobind Singh Indraprastha University, New Delhi.
- **Prof. Subrata Sinha**, Director, National Brain Research Centre, Manesar, Gurgaon.
- **Dr. Rashmi Priya**, Institute for Molecular Bioscience, The University of Queensland, Australia.
- **Dr. Ravi Gupta**, University of Arkansas for Medical Sciences, USA.
- **Dr. Arnab Gupta**, Calcutta University, Kolkata, West Bengal.
- **Prof. Gourinath Ghosh**, University of California San Diego, USA.
- **Dr. Rishi Porecha**, Rainin Instrument LLC, USA.
- **Prof. Hemanta K. Majumdar**, Indian Institute of Chemical Biology, West Bengal.
- **Prof. B. Jayaram**, Indian Institute of Technology, New Delhi.
- **Prof. Hemanta K. Majumdar** from Indian Institute of Chemical Biology, West Bengal visited the Centre and delivered a lecture entitled “DNA topoisomerases as therapeutic targets for drug development on April 28th, 2016.
- **Dr. Rishi Porecha** from Rainin Instrument LLC, USA visited the Centre and delivered a lecture entitled “Goog Pipetting practices” on June 6th, 2016.
- **Prof. Gourisankar Ghosh** from University of California San Diego, USA visited the Centre and delivered a lecture entitled “Distinct Phosphorylation States and Diverse Transcriptional Activities of BCL3: An Oncoprotein I the NF-kB-IkB Family” on August 23rd, 2016.
- **Dr. Arnab Gupta** from University of Calcutta visited the Centre and delivered a lecture entitle “Interaction of genetic and metabolic factors determine Wilson’s disease phenotype” on September 14, 2016.
- **Prof. Tapas Kumar Kundu** visited the Centre and delivered a lecture entitled “(i) Genes Habit and Disease: Implications of Epigenetics (ii) Fundamental of

Eukaryotic Transcription (iii) Histone Modifications: Enzymes, regulation and target for drug discovery” on September 20th & 21st, 2016.

- **Prof. Anindya Dutta** from University of Virginia, USA visited the Centre and delivered a lecture entitled “Noncoding RNAs in muscle differentiation and cancer progression” on October 6, 2016.
- **Dr. Wong** from Eppendorf Asia Pacific, Malaysia visited the Centre and delivered a lecture entitled “Cell Imaging Considerations” on November 8th, 2016.
- **Dr. Debabrata Chakravarti** from Northwestern University visited the Centre and delivered a lecture entitled “Nuclear receptor and epigenomic signaling in cancer and tissue fibrosis” on December 9, 2016.

45. List the teaching methods adopted by the faculty for different programmes.

**Chalk & Board, Powerpoint slides presentations, Literature and textbooks and students delivers seminars in Journal Club.**

46. How does the department ensure that programme objectives are constantly met, and learning outcomes are monitored?

Faculty members discuss

47. Highlight the participation of students and faculty in extension activities.

- SCMM values the need for scholarly activities beyond those mentioned in the syllabus strongly. In a laboratory-specific basis, trips to different research institutes in Delhi/NCR region (like THSTI, RCB, DU, AIIMS, etc.) are organised and batches from both Integrated MSc-PhD as well as PhD students of SCMM participate to discuss scientific aptitudes. These are focused beyond the subject of their current research.

48. Give details of “beyond syllabus scholarly activities” of the department.

Workshops on research works & Live Demonstration of sophisticated equipment

49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.

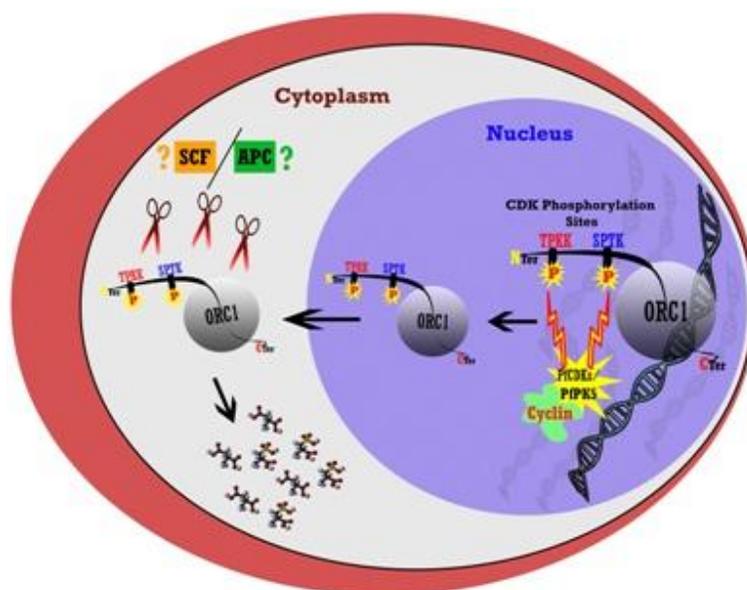
50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.

Outcome/deliverables:

1. **Studies on mechanism of action and modulation of nuclear receptor PXR led to the findings that it acts as a ‘master-regulator’ of cellular detoxification**

**machinery and it is involved in metabolism and elimination of endobiotics, xenobiotics, clinical drugs, dietary constituents, etc.**

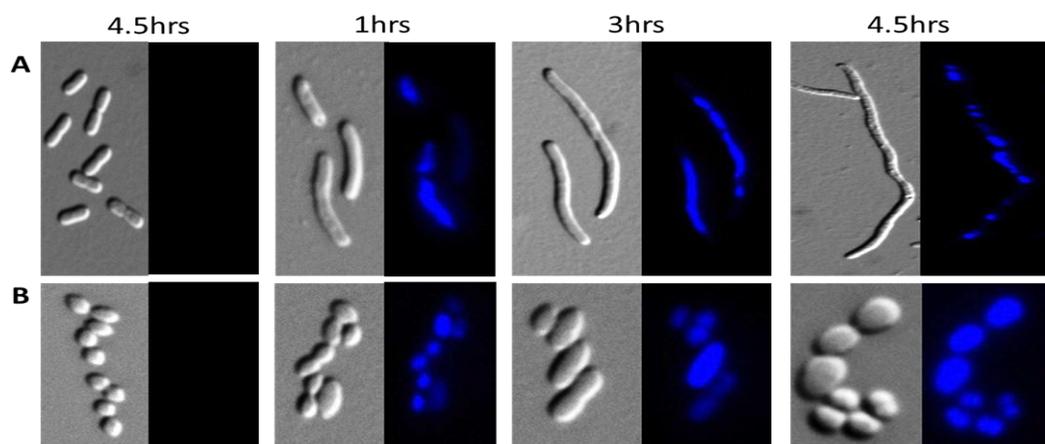
- Naturally occurring non-synonymous SNPs in PXR variants in human population have been characterised on multiple parameters and are shown to alter receptor functioning.
- A novel *Plasmodium falciparum* CDK like kinase PFPK5 has been characterized and its cellular target has been determined (Fig. 1).** PfPK5 phosphorylates PfORC1 protein leading to its degradation during late schizont stage. Since PfORC1 is essential for parasite DNA replication and var gene regulation, inhibition of PfPK5 may be found useful for regulation of parasite DNA replication and other related processes.



**Fig.1.** Model for PfORC1 regulation through phosphorylation during blood-stage development. In the early stages of parasite development, PfORC1 remains into the nucleus in chromatin-bound form. During later stages, it becomes phosphorylated at its N terminus by PfPK5, dissociates from DNA and relocates to cytoplasm, where it is degraded by the proteasome following ubiquitination mediated by either the SCF or the APC protein complex. The image has been taken from Deshmukh A et al., *Mol. Microbiol.* (2015).

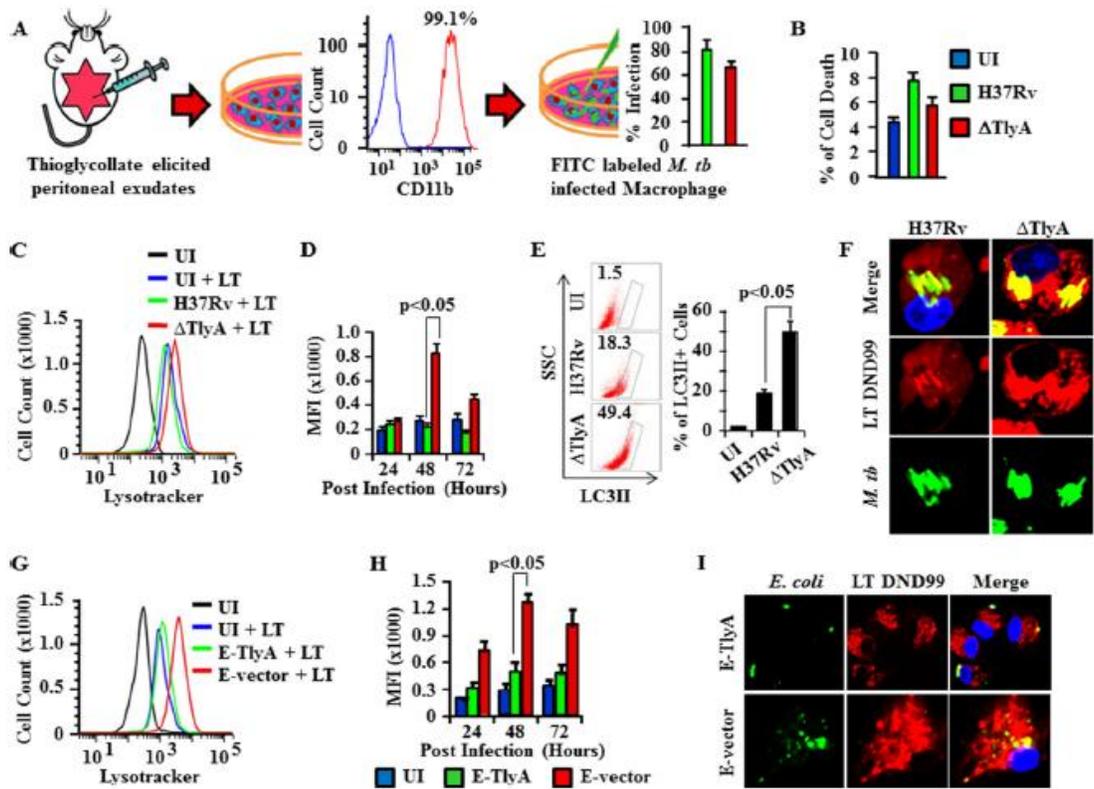
- Method of screening anti-Plasmodial activity of Acriflavin as an antimalarial agent.** A US patent has just been granted on the use of acriflavin as antimalarial both in vitro parasite culture and in vivo animal model (US Patent 9375426B2, dated June 28, 2016).

5. **Broad spectrum antibacterial activity of novel bisbenzimidazoles targeting topoisomerase IA has been established (Fig. 2).** Further, the synergistic effect of bisbenzimidazole with efflux pump inhibitors against pathogenic bacteria has been reported



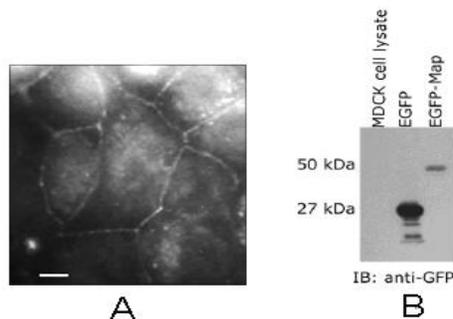
**Fig. 2.** (A) Effect of BPVF (bisbenzimidazole) treatment for 1.5, 3 and 4.5 hr on survival of *E.coli* K12 cells (B) Effect of 12a treatment for 1.5, 3 and 4.5 hr on survival of *S. aureus* cells. The results show the broad spectrum effect of bisbenzimidazoles.

6. Novel malonyl and dioxolan derivatives of indole have been synthesised and characterised as HIV-1 integrase strand transfer inhibitors.
7. **A novel method of directed evolution of proteins called codon-shuffling has been invented.**
8. **Transgenic *P. falciparum* parasites have been generated that can be used to understand the mechanism of artemisinin resistance in drug-resistant malaria.**
9. **Establishment of the role of TlyA in *M. tuberculosis* for the suppression of autophagy in infected macrophages (Fig. 3).** It has been found that H37Rv $\Delta$ TlyA-infected macrophages exhibited exaggerated autophagic activity compared with uninfected and H37Rv-infected macrophages.



**Fig.3.** TlyA of *M. tuberculosis* inhibits autophagy (A-I). The experiments were done either using uninfected macrophages or H37Rv wild type or H37Rv $\Delta$ TlyA-infected macrophages.

10. Enteropathogenic *E.coli* (EPEC) has been used as a model to study leakage through tight junctions which cause diarrheal disease. **Stable cell lines expressing the EPEC effectors EspF and Map (Fig. 4) as *in vitro* models of pathogenesis have been generated.**



**Fig. 4.** EGFP-map expression in the Map stable cell line (A) and in the cell lysates (B).

11. Host proteins that interact with EspF and Map have been identified that will help to determine the signalling pathway(s) activated by these effectors.
12. **Methods for selective detection and analysis of small molecules for high throughput metabolomics studies have been developed.**
13. **It has been established that *Leishmania donovani* blocks iron release of infected host cells** by blocking translation of unique iron transporter ferroportin which helps the parasite to obtain intracellular iron for its growth and survival.
14. It has been observed that oxidative stress regulates cellular iron homeostasis genes by a very complex way **that may lead to neuronal iron accumulation that is commonly associated with almost neurodegenerative diseases.**
51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.  
**Strengths:** (i) The Centre Faculties are pursuing research of highly Inter-Disciplinary nature (ii) The Research at SCMM is translational in nature.  
**Weaknesses:** Nil
52. Future plans of the department.
  - (i) **SCMM is planning to increase the number of M.Sc. students being admitted in Molecular Medicine programme at SCMM upto 20.**
  - (ii) **SCMM is planning to develop a BSL-3 animal facility to handle M. Tuberculosis and malarial parasites.**
  - (iii) **SCMM will be recruiting 6 more faculties in different research areas by 2017.**
  - (iv) **SCMM propose to build one more floor on existing building of SCMM in order to accommodate new faculties and students.**
  - (v) **The faculty-wise future plan mentioning their future research objectives are given below:**

**PROF. CHINMAY K MUKHOPADHYAY:**

This Research Group is working on ‘Infectious diseases and metabolic disorders’. Iron and oxygen take part in multitude of physiological reactions in order to sustain life across the species. Alterations of iron and oxygen homeostasis may lead to pathogenic conditions like cancer, aging, cardiovascular disease, neuronal disease, diabetes and infection related immunity. In the laboratory, they are currently

investigating the influence of iron and oxygen homeostasis on the development of diseases like insulin resistance related disorders, Parkinson disease, cardiovascular disorders as well as parasitic infection.

Below are the main objectives for future research work:

1. To study the role of iron in leishmania–macrophage interaction.  
Objective : Iron is essential for survival and growth for both the host and pathogen. The objective of the current study is to understand the mechanism by which *Leishmania donovani* interferes the iron homeostasis of host macrophages for its survival benefit.
2. To study the role of catecholamine stress hormones on cellular iron metabolism.  
Objective: Adequate availability of iron is important for cellular energy metabolism. Catecholamines like epinephrine and norepinephrine promote energy expenditure to adapt to conditions that arose due to stress. To restore the energy balance epinephrine/ norepinephrine exposed cells may face higher iron demand. So far, no direct role of epinephrine/norepinephrine on cellular iron homeostasis has been reported. The objective of the current study was to explore the role of epinephrine/norepinephrine on cellular iron homeostasis.
3. Brain iron homeostasis and neurodegenerative diseases  
Objective: To study the regulation iron homeostasis in response to oxidative stress in neuronal and astroglial cells.

### **PROF. GAURANGA MUKHOPADHYAY:**

*Helicobacter pylori* are the major cause of chronic gastritis and play an important role in the pathogenesis of peptic ulcer, gastric adenocarcinoma and gastric lymphoma. Although half of the world's population carries the highly diverse bacteria *Helicobacter pylori*, the clinical sequel develops in only a fraction of colonised individuals and most likely depend on differentially represented bacterial determinants and host characteristics. Type IV secretion systems (TFSS) play an important role in the virulence of a number of pathogenic bacteria including *H. pylori*. TFSS are ancestrally related to the bacterial conjugation system and are thought to be versatile transporters of proteins and/or nucleic acids (effectors molecules) across the bacterial membrane to the extra cellular space or into eukaryotic target cells. The basic aim of this work/research group is to understand the adaptation of TFSS to pathogen-host interactions using variety of biochemical,

cell biological and molecular biological methods. In the long run, the study may help to identify new target(s) for anti bacterial treatments.

Prof. Mukhopadhyay's Laboratory is working on *H. Pylori* Cag type IV secretion system. The work revealed a novel CagI independent surface localisation of Cag A. Since it has been established that CagX and CagT is surface exposed protein therefore they wanted to see whether CagX or CagT affecting surface localisation of each other or not. Few in vivo experiments are also required to establish these facts.

Following are the major objectives and future plans to ascertain all the facts:

1. To find out the amino acid residue(s) responsible for the interaction of CagX and CagT.
2. To find out the role of other region of CagX which is a matter of investigation. The biological significance of these new interactions may have the way for the development of new avenues of research in TFSS.
3. Also, it has been planned to define the role of other component of *H. pylori* TFSS to understand the specialised and well-adapted functions in detail.

#### **PROF. RAKESH K TYAGI**

This research group is primarily focused on investigation of 'Nuclear receptors in Health and Diseases'.

The Nuclear Receptor superfamily is a large group of ligand-induced transcription factors. Members of this family of receptors are involved in regulation of numerous physiological and pathophysiological processes and have great potential as targets for the treatment of diseases such as cancer, diabetes, coronary heart disease and asthma. Nuclear Hormone Receptors (NHRs), that include steroid hormone receptors, are intra-cellular transcription factors that regulate gene-expression in response to their cognate ligands. They function either as homodimers or as heterodimers with retinoid X receptor (RXR). NHRs are attractive targets for drug discovery because their activities can be modulated and have proved to be 'drug-responsive'. However, many members of this family of receptors remain incompletely understood, both in terms of physiological role and activating ligands. In brief, nuclear hormone receptors represent enormous potential for drug discovery and are continuously being examined to unravel the mysteries underlying their mechanisms of actions. Towards better understanding of the

functional significance of these hormone receptors, some of the comprehensive research projects have already been initiated in our laboratory. Presently, the role of androgen receptor mediated signaling in prostate cancer progression and the role of Steroid & Xenobiotic Receptor in metabolism and clearance of endogenous metabolites and xenobiotics (including prescription drugs) is under investigation.

Research work in Prof. R. K. Tyagi's Laboratory is primarily focused on a 'xenosensor' Pregnane & Xenobiotic Receptor (PXR) along with initiation or continuing work with other receptors like Retinoid X Receptor (RXR), Androgen Receptor (AR) and Constitutive Androstane Receptor (CAR).

The major objectives and future plans of this research group are as follows:

1. Studies on regulation of nuclear receptor Pregnane & Xenobiotic Receptor (PXR) gene
2. Molecular characterization of nuclear receptor Pregnane & Xenobiotic Receptor: influence of polymorphism and receptor truncation on its cellular function
3. Nuclear Receptors as Epigenetic Marks: Role Cellular Transcriptional Memory

**PROF. SUMAN K. DHAR;**

### **DNA replication initiation in the pathogenic bacteria *Helicobacter pylori***

*Helicobacter pylori* is a Gram-negative, spiral-shaped pathogenic bacterium which causes peptic ulcer diseases and chronic gastritis. WHO has recognized *H. pylori* as a primary risk factor for the development of intestinal type gastric adenocarcinoma. The genome sequences of two unrelated isolates *H. pylori* 26695 and J99 have been reported recently. There is no vaccine available in the market at present and prevalence of antibiotic resistant strains is on the rise. Experimental data to understand the basic biology of the bacteria concerning the chromosomal DNA replication of *H. pylori* is scarce. The genomic analysis revealed few interesting data, in particular in the initiation of replication. An origin of DNA replication is not very evident from the genomic analysis. The *dnaC* gene, which codes for DnaC protein delivering the DnaB helicase to prep riming complex is absent. Likewise *HolB* gene, a subunit of core DNA polymerase enzyme was also not found from

the sequence analysis. These findings suggest that *H. pylori* DNA replication may have some unique features. Replication proteins are good targets for therapy. Compounds blocking the replication initiation process could be very useful in this regard. Presently the group is studying the initiation of chromosomal DNA replication in *H. pylori*.

### **Cell cycle regulation and DNA synthesis in *Plasmodium falciparum***

Malaria continues to be a major health problem globally. The situation is becoming alarming due to the lack of an effective vaccine and increasing incidence of antimalarial drug resistance. There is an urgent need to understand the fundamental biology and biochemical processes at the different stages of the parasite. This will help to identify new targets for the development of novel drugs and vaccines. One aspect of parasite metabolism, which could be useful in this regard, is DNA replication. DNA replication takes place at five distinct points in the parasite life cycle. DNA replication initiation, the rate determining step in DNA replication has not been characterised in *P. falciparum*. In *Saccharomyces cerevisiae*, six protein origin recognition complex (ORC) binds to specific DNA sequences near origin of replication and recruit other factors like Cdc6, Cdt1 and Mcm2-7 and form the pre-Replication complex (preRC) facilitating replication initiation. *P. falciparum* genomic database searches revealed the presence of ORC1, ORC5, Cdc6 and MCM homologs. The goal of his laboratory is to understand the mechanism of chromosomal DNA replication initiation by biochemical and genetic analysis of these proteins at different points during erythrocytic stage of the parasite life cycle. The role of replication initiation proteins in apicoplast DNA replication will also be explored. Using protein-protein interaction they are trying to identify and characterise other members of the preRC which might reveal features unique to the parasite DNA replication machinery. Investigation of the components involved in chromosomal and plastid DNA replication initiation and identification of chromosomal DNA replication origin may lead to the identification of new potential drug targets for malaria therapy.

The research group is primarily focused on investigation in the areas of ‘Infectious diseases’ related to understanding DNA replication and Cell cycle regulation in two medically important pathogens: *Helicobacter pylori* and *Plasmodium falciparum*. Below are the future plans and objectives:

1. Characterization of a putative helicase loader Hp0897 that interacts with and modulates the enzymatic activities of replicative helicase (DnaB) in *Helicobacter pylori*
2. Role of Histone H3K9 acetylation in gene expression and DNA replication in human malaria parasite *Plasmodium falciparum*
3. To understand the adaptation of *Helicobacter pylori* Type IV Secretion System (T4SS) to pathogen-host interactions using variety of biochemical, cell biological and molecular biological methods.

**PROF. VIBHA TANDON;**

### **Development of Radioprotectors for Cancer Therapy and Elucidation of their Mechanisms of Actions**

The laboratory of Vibha Tandon is devoted to addressing the urgent unmet clinical need for novel Radio modulators to prevent radiation- induced cell death of normal cells in the treatment of tumor. Radiotherapy plays a key role in the treatment of tumours, however precise mechanism responsible for radiation-induced cell death remain uncertain. Radiotherapy always has a limitation that it affects normal cells also along with the tumour cells. The long-range goal is to be able to contribute “kinder and gentler” chemotherapeutic modalities that have superior pharmacological profile to the clinic. The essential idea is to offer superior and efficacious cancer treatment and management by cancer selective and specific drugs that only wipe out the cancer cells, while do not exert harmful effects on normal cells.

Cancer radiotherapy relies on two essential components, killing cancer cells while sparing normal tissues. The only clinically acceptable radioprotector, Amifostine, has inherent dose-limiting toxicities and has, therefore, stimulated the extensive search for nontoxic, effective, and alternative Radioprotectors. Her laboratory synthesised a number of bisbenzimidazoles and out of them DMA a cytoprotective molecule proved to be an excellent radioprotector in cells and animals both, exposed to  $\gamma$ -irradiation. Hence, it becomes imperative to study the molecular mechanism of action of these ligands. Resultant of gene expression studies the MAPKinase pathway was found to be differentially regulated in response to ligand and

radiation treatment. Relative quantitation of gene expression of the identified proteins and their interacting partners led to the identification of MAP3K14 (NFκB-inducing kinase) as the candidate gene affected in response to DMA. Subsequently, over expression and knock down of MAP3K14 suggested that DMA affects NFκB inducing kinase mediated phosphorylation of IKKα and IKKβ both alone and in the presence of ionizing radiation. They elucidated that DMA provides radioprotection through NIK mediated activation of Nfκβ/AKT/Pi3K pathway. They have done a complete preclinical evaluation of new molecule as radioprotector.

The other major thrust of her laboratory involves identifying a new class of antimicrobials to combat the resistance of bacteria to the existing antimicrobials. Antimicrobial resistance is a rapidly increasing problem impacting the successful treatment of bacterial infectious diseases. To combat resistance, the development of new treatment options is required. One attractive strategy is to develop ligands that selectively target microbial DNA over host DNA. DNA minor groove binders already provide useful antimicrobial and antitumor agents; however, their cytotoxicity in mammalian systems limits their applications. Recently, we reported bisubstituted analogues with impressive DNA affinity yet surprisingly low mammalian cytotoxicity. This suggests that DNA affinity and cytotoxicity are to an extent separable activity for DNA minor groove binders. The bisubstituted benzimidazoles selectively poison bacterial cellular processes while allowing mammalian cells to perform normally. This is in principle, of considerable interest as very few specific inhibitors of topoisomerase I are known till date. Interestingly these molecules do not act on DNA gyrase and also do not inhibit Human Topoisomerase II also.

## **Future Research Strategies**

### **Clinical development of DMA and few other analogs of benzimidazoles as potent Radioprotector and establish their mechanism of action.**

DMA has a dual mode of action as DNA binder and free radical quencher. It has less cytotoxicity and also modulates number of genes including some of cell surviving

genes like AKT and NFκB. Hence, our next move will be to explore the exact mechanism of action of DMA regarding the enhanced radioprotection. In pursuit of our interest the future objectives of her laboratory is;

- 1) To identify the interacting partners of Akt/ NFκB pathway followed by checking the effect of activated Akt by DMA on the various natural substrate like GSK3β, BAD protein along with the role of other regulator of Akt like PTEN, mTOR, p70etc.
  - 2) To confirm activation of Akt by performing the in vitro kinase assay. After DMA treatment, Akt will be immunoprecipitated and its kinase activity against will be analyzed on GSK3β protein which is a substrate of Akt. We expect the enhanced phosphorylation of GSK3β protein in DMA pretreated Akt sample. 3) We would also like to check the interaction of various protein of Akt and NFκB pathway through immune-precipitation in DMA treated cells. Cloned Akt protein will be utilized to reveal mode of DNA repair in the presence of DMA by Akt/ DNAPKcs pathway. In the presence of DMA which factors of DNAPKcs interact with Akt will be studied.
3. Establish the Role of Radiation in Centrosome Amplification and induction of multipolarity in cancer cells cause mitotic catastrophe. Pre-clinically develop centrosome-based “discriminating” chemotherapeutics that would provide cancer selective action and spare healthy cells. Explore the use of Radiotherapy with centrosome declustering drugs leading to multipolarity in cancer cells as a novel regimen for cancer therapy.

### **Design, Synthesis and development of novel selective bacterial Topoisomerase IA inhibitors.**

The other major thrust of her laboratory involves identifying a new class of antimicrobials to combat the resistance of bacteria to the existing antimicrobials. Antimicrobial resistance is a rapidly increasing problem impacting the successful treatment of bacterial infectious diseases. To combat resistance, the development of new treatment options is required.

One attractive strategy is to develop ligands that selectively target microbial DNA over host DNA. DNA minor groove binders already provide useful antimicrobial and antitumor agents; however, their cytotoxicity in mammalian systems limits their

applications. Recently, her laboratory bisubstituted analogues with impressive DNA affinity yet surprisingly low mammalian cytotoxicity. This suggests that DNA affinity and cytotoxicity are to an extent separable activity for DNA minor groove binders. The bisubstituted benzimidazoles selectively poison bacterial cellular processes while allowing mammalian cells to perform normally. This is in principle, of considerable interest as very few specific inhibitors of topoisomerase I are known till date. Interestingly these molecules do not act on DNA gyrase and also do not inhibit Human Topoisomerase II also. Her laboratory is finding out that how bis-benzimidazole derivatives preferentially targets *E. coli* topoisomerase IA. On the basis of results they conclude that DMA blocks the activity at the religation step of the catalytic cycle. Since  $Mg^{+2}$  is responsible for conformational changes in relaxation activity of the enzyme by forming a metal ion bridge which interacts with DNA and three acidic conserved residues Asp111, Asp-113 and Glu-115. So, here there future strategy would be

- 1) To generate few mutants targeting those acidic triad amino acids which we expect DMA to interact with.
- 2) To Compare the concentration of  $Mg^{+2}$  in presence and absence of DMA.
- 3) To revalidate our results, we would like to do structural studies by performing X-ray crystallography and NMR techniques which will give us a detailed picture of interaction pattern of the bis-benzimidazoles with topoisomerase IA enzyme and DNA forming the ternary complex.
- 4) To evaluate efficacy of novel antibacterial molecule in Neutropenic thigh model as well as Septicemia model.

## **PROF. GOBARDHAN DAS**

### **Immunotherapeutic approach for the treatment of tuberculosis, which avoids generation of drug resistant forms of *Mycobacterium tuberculosis*.**

*Mycobacterium tuberculosis (M.tb)*, the etiological agent of tuberculosis (TB), causes nearly two million deaths annually worldwide. One-third of the global population is infected with a latent form of TB, which represents an enormous reservoir

awaiting an opportunity for reactivation. Conditions such as HIV infection that impair immunity may lead to TB reactivation. Thus, the vast reservoir for TB disease is alarming, and its epidemic is becoming a global public health emergency. Unfortunately, cost-effective and user-friendly therapy of TB is long overdue. Current therapy of TB is lengthy and consists of multiple expensive antibiotics, in a strategy referred to as Directly Observed Treatment, Short-Course (DOTS). Although this therapy is effective, it has serious disadvantages. These therapeutic agents are toxic and are associated with the development of a variety of drug-resistant TB strains. Furthermore, patients treated with DOTS exhibit enhanced Post-treatment susceptibility to TB reactivation and re-infection, suggesting therapy-related immune impairment.

Immunotherapy avoids many of the side effects of antibiotic drugs as well as the generation of MDR and XDRs. Although some limited studies for immunotherapy of TB have been performed, this approach remains in the preclinical stage. Approaches employed include recombinant cytokines and antibodies. Immunotherapy has its own limitations. Humanized recombinant proteins employed as immunotherapeutic agents often induce immune responses that pose a considerable risk. Furthermore, side effects of immunotherapeutic agents are often serious. In addition, immunotherapeutic agents are usually very expensive. Because tuberculosis is more prevalent in economically disadvantaged neighbourhoods, immunotherapy may not be the preferred option for treatment of TB. Therefore, there is an urgent need for alternate methods to treat TB, avoiding the use of antibiotics and bio-therapeutic macro-molecules. *Therefore, the group proposes to develop small molecule-directed immunotherapy that promotes differentiation and/or maintenance of protective immune responses.* We believe that such an approach possesses three advantages over conventional antibiotic treatment: 1) expulsion of the harboured tuberculoid organisms, 2) generation of signature protective memory responses and 3) lack of selection for drug-resistant forms of tuberculosis (MDRs). In this approach, small molecules will modulate the host immune response, but will not directly interact with the pathogenic organism. Unfortunately, M.tb is acquiring drug resistance at a faster rate than discovery of new generation antibiotics, and as a result, totally drug resistant (TDR) variant already appears. Therefore, a new approach is urgently needed. *Therefore, the group proposes immunotherapy using ethno medical compounds, which has not been explored so far.* India has a vast resource for the ethno medical compound,

and our results indicated that some of them are effective. Therefore, this therapeutic approach goes under the banner “*our disease-our therapy*”.

The research group is primarily focused on ‘Infectious diseases’ related to understanding *M. tuberculosis* infections.

The major objectives and future plans are as below:

1. To study the molecular mechanism of susceptibility and resistance in murine models of *M. tuberculosis* infection.
2. To compare the immunogenicity of virulent strain H37Rv and its mutant in macrophages derived from susceptible (BALB/c) and resistant (C57BL/6) strains of mice.
3. To compare the T cell responses of virulent strain H37Rv and its mutant during *M.tb* infection in mice model.
4. To study the molecular mechanism of activation of T helper subsets.

**DR. ANAND RANGANATHAN:**

**Inhibiting Protein-Protein Interactions in Pathogens**

Dr. Ranganathan’s laboratory had previously developed a method for the laboratory-directed evolution of proteins, called ‘codon-shuffling’. The potential of this method to create stand-alone *de novo* protein/peptide libraries, for their eventual use as antibacterial and drug-like entities has since been realised. Because of an inherent property of each of the fourteen dicodons (oligonucleotides 6 bases in length) in the ‘dicodon set’ to possess a secondary structure imprint, the assembly of such dicodons creates proteins with well-folded characteristics, largely due to the accumulation of so-called secondary structure imprints that form predefined helical and sheet protein folds. The application of codon-shuffling has been the underlying theme of research in our laboratory for more than a decade. Recently, we isolated a peptide that can disrupt the crucial ESAT6:CFP10 protein-protein interaction in *M. tuberculosis*. Exo- or endogenous presence of this peptide, named HCL2, severely affects mycobacterial growth as well as its cell-wall structure and

colony morphology. It was shown that mycobacteria expressing this peptide show a drastic reduction in colony forming units. Efforts are now directed towards exploring the possibility of an HCL2-attenuated *M. tuberculosis* strain to act as a viable vaccine candidate.

More recently, they discovered a codon-shuffled *de novo* protein M5, of 100 aa length, that was able to disrupt the ICAM-1 dimer formation *in vivo*. The presence of ICAM-1 (Intercellular adhesion molecule) is crucial for the progression of diseases like tuberculosis, HIV, and Malaria. It was shown that M5, in quantities as little as 25  $\mu$ M, is able to block the entry of *P. falciparum* into red blood cells by almost 80%. Not only has this discovery opened avenues to study the role of ICAM-1 or ICAM-like molecules in the invasion process, the drug-like potential of M5, or peptidomimetics based on M5, is also being explored.

The major objectives of this research group are as follows:

1. To study the mechanism of role of Host ICAMs in cell invasion by *Mycobacterium tuberculosis* and *Plasmodium falciparum*.
2. To explore the possibility of an HCL2-attenuated *M. tuberculosis* strain as a viable vaccine candidate.
3. To study the effect of a novel molecule on mycobacteria, and represents a viable starting point for developing potent peptidomimetics.
4. To discover new molecules for TB therapy.

#### **DR. SOUVIK BHATTACHARJEE:**

*Plasmodium falciparum* causes the majority of malaria morbidity and mortality worldwide, with an estimated 781,000 deaths and ~200 million confirmed cases annually (World Malaria Report, WHO, 2014). The symptoms and pathologies associated with acute infection as well as severe disease usually arise during the asexual blood stage of infection, where the free merozoites invade and colonize the host red blood cells (RBCs). In an infected RBC, these intraerythrocytic parasite then matures into trophozoites and schizonts, finally segmenting at ~48 h into 16-32 daughter merozoites that are released to continue subsequent cycles of invasion and replication. The current front line drug are artemisinin that are used in

combination with longer acting antimalarials (sulfadoxine/ pyrimethamine) in artemisinin combination therapy (ACT). Currently, there is no vaccine against malaria, and the recent development of clinical resistance of *P. falciparum* to artemisinin derivatives threatens malaria control and eradication strategies in implementation worldwide. This is further potentiated by the risk of its spread from western Cambodia to the Indian subcontinent and finally reaching Africa, similar to the earlier spread of chloroquine- and sulfadoxine/ pyrimethamine-resistance.

Clinically, artemisinin-resistance is defined as a reduced parasite clearance rate and increased survival half-life in peripheral blood following ACT. Resistance to artemisinin has recently been reported to be a heritable trait and mapped to mutations in a kelch propeller domain containing protein (PlasmoDB ID: PF3D7\_1343700; PfKelch13). However, significant gaps remain in the understanding of cellular functions of PfKelch13 and why it is a marker for resistance. Intricate networks of parasite proteins seem to be involved, including those functioning in chaperone-assisted protein folding, proteasomal degradation and protein-protein interactions, but where they fit into this resistance puzzle, needs thorough investigation. Added to the paradox is the likely contribution(s) from the host, which are completely overlooked but likely to have active mediators.

The major challenges being undertaken this research group are as follows:

1. To understand the cellular functions of kelch propeller domain containing protein PfKelch13.
2. To study the artemisinin-resistance (reduced parasite clearance rate and increased survival half-life in peripheral blood following ACT) through the use of reverse genetics at the parasite level and host modification at the cellular level.

**DR. SAIMA AIJAZ**

***The role of Tight Junctions in bacterial and viral pathogenesis:***

Vertebrate epithelial cells are joined to each other via a set of intercellular adhesive complexes that consist of gap junctions, desmosomes, adherent junctions and tight

junctions. Tight junctions are the most apical component of the epithelial adhesion complex and are composed of a complex protein network that is linked to the cytoskeleton. Tight junctions are important for the barrier properties of epithelia and endothelia and regulate the passage of ions and solutes through the paracellular space. Tight junctions also contribute to the maintenance of cell polarity by forming an intramembrane diffusion fence that restricts the diffusion of lipids between the apical and basolateral plasma membrane domains. More recently, tight junctions have been reported to play a role in the regulation of cell proliferation and differentiation. Tight junctions also play a pivotal role in the pathogenesis of diseases. The tight junction complex serves as an initial point of contact for several bacterial and viral pathogens, and its modulation by these pathogens can be utilised to study the process of pathogenesis in greater detail. These bacterial and viral pathogens have devised sophisticated strategies to modify the function of tight junctions in order to infect host cells. The main goal of the laboratory is to investigate how tight junctions regulate and participate in the pathogenesis of diseases. This will lead to the identification of new molecular targets which can be used for the development of novel therapies for diseases.

The major objectives and future plans of the research group are as below:

1. To investigate the mechanism(s) of Regulation of Epithelial Tight Junctions in pathobiology
2. To characterise of EspF-mediated TJ disruption by calcium switch assays.
3. Functional characterization of the role of actin cytoskeleton in EspF-mediated TJ disruption

## **DR. DIPANKAR GHOSH**

### ***Innate Immunity***

A myriad of innate immune determinants plays critical role in mammalian host defense against infectious threat. These factors often precede the temporal profiles of adaptive immunity and therefore act as the ‘first line of defense’ against infection. Among the most significant of these innate immune determinants are cationic antimicrobial peptides (like lysozyme and defensins) – that confer broad-spectrum innate immunity to the host. It is also understood that these peptides and related determinants play a significant role in modulating microbial colonisation and

endogenous flora in the host. Dr. Ghosh is interested in exploring the relationships between such innate immune determinants and microbial biofilm formation in the specific physiological niche. This research group is focused on 'Infectious diseases' is primarily involved in the investigations on 'infectious biofilms'.

The major objectives and future plans are as below:

1. To study the early host-microbe relationships in oral *Lichen planus*
2. To study the mechanism of pathobiology of MDR Nosocomial Bacterial Biofilm Infections.

## Evaluation Report of Special Center for Nano Sciences

The Centre has faculty members with background in Physics, Electronics, Biology, Materials Science, and Electron Microscopy.

Presently, Common Instrumentation Facility (CIF) of the Centre has nanomaterial synthesis and nano- biosynthesis labs consisting of all basic characterization facilities including UV-vis, Raman spectrophotometer, BOD Incubator, Laminar Hood, Dynamic Light Scattering, Zeta Potential Measurement, UV-NIR Spectrophotometer, Viscometry, Tensiometry, Potentiostat-Galvanostat, Cell culture facility, Fluorescence Spectrophotometer, Contact Angle Measurement, Elisa Reader, etc.

The Nano-electronics and microwave laboratory consists of DC and microwave probe-stations, microwave nano-devices testing facilities like; Vector Network Analyzer (Keysight Inc. PNA - 44 GHz), Spectrum Analyzer (Rohde and Schwarz Inc. - 40 GHz), Microwave Power Amplifier (Marki Microwave inc.) for absorber testing, angle and temperature dependent variable-frequency Ferromagnetic Resonance (FMR) system. For nanostructure deposition, we have multi-target RF Sputtering and thermal evaporation system. For in-vivo and in-vitro study we have automated Radio-Frequency Hyperthermia system (MSI AUTOMATION, INC.) on mouse model and human cell-lines.

The Ferroelectrics and Multiferroics Characterization Laboratory consist of Impedance Analyzer (20-120 MHz, Keysight Technologies), Sawyer-Tower Ferroelectric/Multiferroic Hysteresis Loop Measurement Setup; Liquid Nitrogen Cryostat (77 – 800K), etc.

Nanobio lab consists of human cell culture and storage facility (-20oC). We also have Fluorescence Microscope to monitor nanotoxicity and nanobiointerface. We have Multichannel Electrochemical analyser to get electrochemical response of multianalytes on a single electrode. Beside this, we have Electrospinning setup for synthesis of nanofibres for biomedical application.

The thin-film laboratory has a RF-DC magnetron sputtering system. Presently thin-films and bulk materials of functional oxides are being synthesised using mixed oxide and wet chemistry methods. Lead-free ferroelectrics and antibiofilm are currently being investigated. TEM investigations are an integral part of the research which will be carried out at AIRF of the University. Ion milling machine for preparing TEM samples is being installed at AIRF.

A wide range of analytical facilities including XRD, Transmission Electron Microscopy, Scanning Electron Microscopy, PPMS, Confocal Microscope, and other on-line cell imaging facilities are available at the Advanced Instrumentation and Research Facility (AIRF), which is a central facility of the JNU.

**Programme of Study:**

M.Tech.in Science & M.Tech. in Electronics (Winter semester (January - June) 2016

(i) Ph.D. Program: Candidates shall be considered for admission to the Ph.D. programme on the following basis:

(a) Obtained M.Phil./M.Tech. Degree from a recognised University/Institution with one publication

OR

(b) M.Sc. degree from a recognised University/ Institution and 2 years of research experience with one publication

(c) Centre reserves the right to adopt additional criteria for short listing of the applications.

OR

(d) Candidates must have M.Sc. / M.Tech./ M.E. / B.Tech. / B.E. degree with at least 55% marks or equivalent grade point.

The candidates must have qualified UGC- CSIR/ICMR/NBHM/DBT fellowship or DST Inspire fellowship or any other national level examination that guarantees a fellowship from the funding agency concerned.

[Additional requirements are mentioned in the JNU website](#)

(ii) M.Tech. in Science & M.Tech. in Electronics

M.Tech. Degree Credit Requirements:

No student admitted to the program shall be eligible for the award of M.Tech. Degree unless he/she secures 55 credits in all out of which at least 45 credits shall be for course work and 10 credits for the dissertation and final presentation. Students securing minimum required CGPA as per ordinance will be eligible for M. Tech. degree.

Additional requirements are mentioned in the JNU website

**Evaluative Report of the Department  
( 1 April 2012- 31 March 2016)**

1. Name of the Department: **Special Centre for Nanoscience**
2. Year of establishment: **21 June 2010**
3. Is the Department part of a School/Faculty of the University?: **Special centre of the University**
4. Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt.,etc.);  
(i) **Ph.D,**  
(ii) **Offering M. Tech. from the academic session 2017-18**
5. **Interdisciplinary programmes and departments involved:** School of Physical Sciences, School of Life Sciences, School of Environmental Sciences, AIRF
6. **Courses in collaboration with other universities, industries, foreign institutions, etc..NA**
7. Details of programmes discontinued, if any, with reasons. **NO**
8. Examination System: Annual/Semester/Trimester/Choice Based Credit System: **Semester**
9. Participation of the department in the courses offered by other departments: **NA**
10. **Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/Asst.Professors/others)**

	<b>Sanctioned</b>	<b>Filled</b>	<b>Actual (including</b>
<b>Professor</b>	02	00	<b>01 filled CAS</b>
<b>Associate Professors</b>	05	02	
<b>Asst. Professors</b>	03	02	

Others			
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11. Faculty profile with name, qualification, designation, area of specialization, experience and research under guidance

Name	Qualification	Designation	Specialization	No. of Years of Experience	No. of Ph.D./ M.Phil. Students guided for the last 4 years
<b>Prof. Bijoy K. Kuanr</b>	Ph.D	Professor	Microwave Electronics	26	<b>Ph. D. = 02</b> <b>M. Tech.= 08</b>
<b>Dr. Satyendra Singh</b>	Ph.D	Associate Professor	Materials Science	16	<b>M.Tech. = 08</b>
<b>Dr. PratimaSolanki</b>	Ph.D	Assistant Professor	Biology	14(10 year Research +4	<b>Ph. D. = 01</b> <b>M. Tech. =</b>
<b>Dr. BalajiBirajdar</b>	<b>Ph.D</b>	<b>Assistant Professor</b>	<b>Physics</b>	<b>09(5.5 year Research +3.5</b>	<b>M. Tech. = 03</b>

12. List of Senior Visiting Fellows, adjunct faculty, emeritus professors: **NO**

13. Percentage of classes taken by temporary faculty – programme-wise information: **NA**

14. Programme-wise Student-Teacher Ratio: **1: 2.5**

15. Number of academic support staff(technical)and administrative staff: sanctioned, filled and actual: **One Junior Technical Assistant + 1 contractual computer Assistant**

16. Research thrust areas as recognised by major funding agencies:  
**(i) Microwave Monolithic Nano Devices,**  
**(ii) Biosensor, Microfluidic and**  
**(iii) Ferroelectric**

17. Number of faculty with ongoing projects Performa a) national b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.

Name of faculty	Title of project	Funding agency	National /International	Total Grants
<b>Bijoy. K. Kuanr</b>	Microwave Monolithic Devices using Magnetic Nanostructures	DST	National	67 lakhs
<b>Bijoy. K. Kuanr</b>	Electronically tuned ultra-wide band Microwave Monolithic Devices using Magnetic Nanostructures	MHRD – IMPRINT	National	5 Crores
<b>Pratima Solanki</b>	Development of nanobiochip for oral cancer detection	DST	National	Rs. 66,06,660
<b>Pratima Solanki</b>	Electrochemical Microfluidic based nanobiochip for mycotoxin detection	DBT	National	Rs.62,21,000/-
<b>Pratima Solanki</b>	Effect of ion irradiation on Biopolymer-metal oxide based nanocomposites for removal of water pollutants	IUAC	National	Rs. 6,00,000/-
<b>Satyendra Singh</b>	Magneto-electric multiferroic nanostructures for non-	SERB	National	Rs.45,10,000/-

Name of faculty	Title of project	Funding agency	National /International	Total Grants
	volatile memory device applications			
<b>Balaji Birajdar</b>	Nanostructure Dielectric properties relationship in lead-free relaxer ferroelectric using TEM	IUAC	National	Rs. 6,00,000/-

**18. Inter-institutional collaborative projects and associated grants received**

- a. National collaboration      b)  
 International collaboration  
 IIT Delhi  
 All India Institute of Medical Sciences (AIIMS, Delhi)  
 National Physical Laboratory, Delhi  
 IUAC

**19. Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received.**

DST-Nanomission  
 MHRD - IMPRINT  
 UGC-Start-up  
 DBT  
 SERB  
 IUAC

**20. Research facility/centre with**

- State recognition
- National recognition
- International recognition

21. Special research laboratories sponsored by / created by industry or corporate bodies: **NA**

**22. Publications:**

- \* Number of papers published in peer-reviewed journals (national/international) : 23
- \* Monographs
- \* Chapters in Books: 03
- \* Edited Books
- \* Books with ISBN with details of publishers
- \* Number listed in International Database (For *e.g.* Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.)
- \* Citation Index – range /average
- \* SNIP
- \* SJR
- \* Impact Factor – range /average
- \* h-index

23. **Details of patents and income generated:** 02 (filled)

24. **Areas of consultancy and income generated**

25. **Faculty selected nationally/internationally to visit other laboratories/institutions / industries in India and abroad**

26. **Faculty serving in**

- a. **National committees** b) **International committees** c) **Editorial Boards** d) **any other (please specify)**

27. **Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs).**

**Workshop: 03**

**Student projects**

- **percentage of students who have done in-house projects including inter-departmental projects**
- **percentage of students doing projects in collaboration with other universities / industry / institute**

28. **Awards/recognitions received at the national and international level by**

- Faculty

- Doctoral/postdoctoral fellows
  - Students: **International conference – best poster award (01), National Science day - best poster award (01)**
29. **Seminars/Conferences/Workshops organised and the source of funding (national/international) with details of outstanding participants, if any.**  
International Conference: 01, workshop 03  
Title : ICRANN 2016  
**Source of funding: DRDO, DST (for conference), workshop (by Industry)**
30. **Code of ethics for research followed by the departments: Before sending the manuscript for publications in reputed journals - Checked by plagiarism.**
31. **Student profile programme-wise:**

Name of the Programme (refer to)	Applications received	Selected		Pass percentage	
		Male	Female	Male	Female
Ph.D. (2016-2017)	18	04	01		

32. **Diversity of students**

Name of the Programme (refer to no. 4)	% of students from the same universit	% of from other universities within the State	% of from universities outside the State	% of from other countri
Ph.D.	nil	02	03	nil

33. **How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise. NA**

34. **Student progression**

Student progression	Percentage against enrolled
UG to PG	
PG to M.Phil.	
PG to Ph.D.	

Ph.D. to Post-Doctoral	
Employed <ul style="list-style-type: none"> <li>• Campus selection</li> <li>• Other than campus recruitment</li> </ul>	
Entrepreneurs	

35. Diversity of staff

Percentage of faculty who are graduates	
of the same university	
from other universities within the State	01
from universities from other States	02
from universities outside the country	01

36. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. During the assessment period: NA

37. Present details of departmental infrastructural facilities with regard to

- a. Library
- b. Internet facilities for staff and students
- c. Total number of classrooms: **Single**
- d. Classrooms with ICT facility : **Projector**
- e. Students' laboratories : **00**
- f. Research laboratories: **02**

38. List of doctoral, post-doctoral students and Research Associates: NA

- a. from the host institution/university

- b. from other institutions/universities:
39. Number of postgraduate students getting financial assistance from the university.
40. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.
41. Does the department obtain feed back from
- s. faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilize the feed back?
  - t. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilize the feedback?
  - u. Alumni and employers on the programmes offered and how does the department utilize the feedback?
42. List the distinguished alumni of the Department (maximum 10): **NA**
43. Give details of student enrichment programmes (special lectures / workshops / seminar) involving external experts. :
- |                        |             |
|------------------------|-------------|
| <b>Special Lecture</b> | <b>: 02</b> |
| <b>Workshop</b>        | <b>: 03</b> |
| <b>Seminar</b>         | <b>: 01</b> |
44. List the teaching methods adopted by the faculty for different programmes.:  
**teaching by tutorials, power-point presentation, group discussion, etc.**
45. How does the department ensure that programme objectives are constantly met, and learning outcomes are monitored? **Through International research publications in reputed International Journals, Patents, Book chapters.**
46. Highlight the participation of students and faculty in extension activities.  
**: Actively participated in Swacha-Bharat Aviyan**  
  
**: participated in academic of Woman Excellence (National program of training of Scientist & Technology)**

47. Give details of “beyond syllabus scholarly activities” of the department.:  
**organised various workshop, instruments related hands-on training,**
48. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.
49. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.
50. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.  
**Major Strengths: Interdisciplinary research, Inter-Institutional Research,**  
**Challenges: to get funds to procure high-end instrumental facilities,**
51. Future plans of the department.  
**(i) Starting M. Tech in Science (10 seats) and M. Tech. in Electronics (10 seats) from academic session 2017-2018.**  
**(ii) Plan to start 5 years B. Tech. & MS integrated program in Electronics & Communication Engineering very soon**