ANNUAL REPORT
2015-16

157/F NILGUNJ ROAD, PANIHATI, SODEPUR, KOLKATA, WEST BENGAL.
PIN-700114
www.gnipst-pc.ac.in

1) Principal's Message:

It is my privilege to warmly welcome you to this great institution dedicated to the cause of top quality technical education with the mission of "To impart high quality pharmaceutical science, technology and management education to the budding professionals and provide the ambience needed for developing requisite skills to make a mark of excellence in Education, Research, Business, Industry and achieve highest personal standards.". The exemplary infrastructural facilities, the team of highly qualified and dedicated faculty and the exhilarating atmosphere in the campus will surely take you to enviable heights in your capabilities and achievements.

In last 10 years, 612 students have graduated in pharmaceutical technology from our college. Many of our College Alumni are holding good positions in a number of well known organizations, not only in our country but also abroad.

The College has well qualified, experienced and dedicated faculty and supporting staff, state of the art laboratory facilities, computer facilities, Library and Information Centre, outdoor and indoor games, seminar hall, round the clock Internet and wi-fi facilities & separate hostels for Boys and Girls in the campus.

The College encourages faculty members to acquire higher degrees, to publish text books/papers and participate in Seminar/Workshop/Conferences that are held not only within our country but also abroad. Even some of our students have published scientific papers. The college encourages students to take part in co-curricular activities.

The college has a full-fledged "Training and Placement Cell". This Cell organizes industry visits for 2nd year B. Pharm students and industrial tours for 4th year students. The compulsory industrial training is also organized by this cell for the third year B.Pharm students. In collaboration with the "Entrepreneurship Development Cell", the "Training and Placement Cell" organizes a "Finishing School Training Program" for B. Pharm. 3rd and 4th year students and Post graduate students of the college. "Training and Placement Cell" has enabled our college students to participate in several recruitment programmes of many leading organizations.

Students are encouraged to participate in inter collegiate competitions in outdoor/indoor sports / games, cultural events and technical paper presentation competitions. The college also organizes several Inter collegiate Sports tournaments and technical paper presentation competitions. Many of our college students have presented GNIPST in various sports and games,

I once again welcome you to the GNIPST family and wish your journey with us will be long cherished by you and help you build your career in future ahead.

Dr. Abhijit Sengupta
Director- cum –Principal

PROGRESS AT A GLANCE (2015-2016)

- The Institute was awarded B grade by "National Assessment and Accreditation Council" with a CGPA of 2.7 out of 4.

- Dr. Swati Chakraborty receieved a grant of 20 lakhs from West Bengal State DST for a Project titled "Identification of heavy metal chromium and nickel tolerance bacteria to develop microbial biosensor and their role on secondary metabolite of medicinal plant *Bacoppa monnnieri* in metal contaminated soil of east Kolkata wetland."

- **Thirteen trust sponsored projects** are being executed by the faculty members presently.

- The institute celebrated National Science Day with a one day seminar titled **"Current innovations in Biotechnology in human welfare"** on 7th November 2015 with grants received from West Bengal state DST.

- The faculty members of the Institute have publication and acceptance of **5 papers in peer-reviewed journals** and also published **19 research papers in proceedings of national and international conferences** in 2015-16.

- Faculty members acted as reviewers for **3 peer-reviewed journals** like Pharmaceutical Biology, Journal of Ethnopharmacology etc.

- A total of five **workshops/ seminars/ refresher courses** were organized by the Institute for the period of 2015-16.

- A one day **Faculty Development Programme and Research Initiative** was organized by the institute on 21st December, 2015**.**

- The faculty members of the institute have attended a number of workshops, national and international conferences.

- The Institute has initialized the procedures of formation of an **"Incubation Centre"** and a **"Drug Testing Laboratory".**

- **Collaborative Research** activities are being carried out with Jadavpur University, Stadmed Pharmaceuticals, Janata Dairy, Hash Technologies etc.

- A total of 120 students took admission in B.Pharm. through West Bengal Joint Entrance Examination (WBJEE),Joint Entarnce Examination (Main) [JEE (Main)] and Common Entrance Examinations-Association of Minority Professional Institutes (CEE-AMPAI).

- A total of 17 students took admission in M.Pharm through GPAT and Post Graduate Entrance Test (PGET) organized by West Bengal University of Technology (WBUT). Five students took admission in M .Pharm (Pharmacology) whereas eight students opted for M.Pharm. (Pharmaceutics)

- A finishing school cum training program was organized jointly by the Training and Placement Cell and the Entrepreneurship Development Cell of the Institute.

- A total of 100 students of B. Pharm 3rd year did their industrial training in various institutes in and outside West Bengal.

- 100 students of B.Pharm 2nd year were taken on Industry visits to East India Pharmaceutical Works etc.

- The 4th year students went for industrial tour to different industries in Sikkim.

- 74 students were placed in the session 2015-2016.

- 24 students had GPAT ranks.

- Eight students presented papers in national and international conferences.

- Comparative subject wise result analysis showed an improvement from the previous year's results.

- Six different cultural programs were organized by the cultural committee like Fresher's Welcome, Bijaya Sammilani, Farewell, Reunion etc.

- Eight welfare events like "Garment distribution", "Swach Bharat Abhiyan", "Walk for unity" etc were organized by the Social welfare Committee in association with Social welfare Club.

- Different sports events were organized by the sports committee and sports club all throughout the year.

.

1. FACULTY DEVELOPMENT:

✓ The Institute was awarded B grade by "National Assessment and Accreditation Council" with a CGPA of 2.7 out of 4.

a) SEMINAR / WORKSHOP ATTENDED (DEPARTMENT WISE)

Guru Nanak Institute of Pharmaceutical Science and Technology (GNIPST) encourages the faculty members to attend workshops, conferences, seminars etc. A total of 41 registrations were recorded from the faculty members of GNIPST

Sl. No.	Name of Applicant	Applied for seminar/ workshop/conference (TITLE)	Type of Programme	Duration	Place of the function
1.	Dr. Abhijit Sengupta	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
2.	Dr. Sumana Chatterjee	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
3.	Dr. Lopamudra Datta	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University

4.	Dr. Prerona Saha	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
5.	Dr. Sriparna KunduSen	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
6.	Dr. Asis Bala	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
7.	Mr. Debabrata Ghosh Dastidar	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
8.	Ms. Moumita Chowdhury	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University

9.	Ms. Priyanka Ray	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
10.	Mr. Abir Koley	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
11.	Ms. Sumana Roy	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
12.	Ms. Jeenatara Begum	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
13.	Ms. Anuranjita Kundu	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University

14.	Mr. Soumya Bhattacharya	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
15.	Mr. Samrat Bose	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
16.	Dr. Kausik Sen	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
17.	Mr. Sampat Kumar Kundu	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University
18.	Mr. Sourav Pal	**2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**	National Seminar	5-6 December, 2015	Jadavpur University

19.	Dr. Swati Chakraborty	**Frontier in Modern Biology 2015**	National Seminar	5-6 December, 2015	IISER, Kolkata
20.	Dr. Sriparna Kund Sen	**Drug and Diseases: Role of Pharmacists and Doctors**	National Conference	16th January, 2016	Jadavpur University, Kolkata
21.	Dr. Prerona Saha	**Drug and Diseases: Role of Pharmacists and Doctors**	National Conference	16th January, 2016	Jadavpur University, Kolkata
22.	Ms. Anuranjita Kundu	**Drug and Diseases: Role of Pharmacists and Doctors**	National Conference	16th January, 2016	Jadavpur University, Kolkata
23.	Ms. Jeenatara Begum	**Drug and Diseases: Role of Pharmacists and Doctors**	National Conference	16th January, 2016	Jadavpur University, Kolkata
24.	Ms. Tamalika Chakraborty	**Drug and Diseases: Role of Pharmacists and Doctors**	National Conference	16th January, 2016	Jadavpur University, Kolkata
25.	Mr. Sampat Kumar Kundu	**Drug and Diseases: Role of Pharmacists and Doctors**	National Conference	16th January, 2016	Jadavpur University, Kolkata
26.	Dr.. Swati Chakraborty	**International conference on Social issues and Social Work: Public and Private**	International	29th January, 2016	IISWBM, Kolkata

b)REFRESHER COURSE ORGANIZED BY THE INSTITUTE

The institute organized a one day faculty development programme on 21st December, 2015. It aimed to educate the faculty members and scholars about the current research scenario.

SL	TITLE	DEPARTMENT	DATE
1	Faculty development programme and research initiative.	Pharmaceutical Technology	21/12/2015

c) SEMINAR / WORKSHOP ORGANIZED BY INSTITUTE   (JULY,2015-JUNE 2016)

The institute organized seven workshops/ seminars/ finishing school in the year of 2015-16.

SL NO	NAME OF THE SEMINAR/CONFERENCE	DATE
1.	World Hepatitis Day	28.7.15
2.	National Science Day (Current Innovation in Biotechnology In Human Welfare)	7.11.15
3.	One Day faculty development Programme and Research Initiative	21.12.15

National Science Day Seminar on "CURRENT INNOVATIONS IN BIOTECHNOLOGY IN HUMAN WELFARE"

d) RESEARCH & DEVELOPMENT

i) Journal - In 2015-16, a total of five international publications was made by the faculty members of the institute.

List of Journal Publications (International)

1. **R. Deb Mondal, A. Banerjee, A. Bala**, **A. Sengupta**. "*Avicennia alba*: The New phytochemical weapon to fight against acute inflammation." *International Journal of Pharmacology and Pharmaceutical Sciences:* 2015; **2(5)**, 6-12.

2. **P. Saha**, U. K. Mazumder, P.K. Haldar. "Evaluation Of Antiinflammatory And Antinociceptive Properties Of *L.siceraria* Aerial Parts." *International Journal of Pharma Sciences and Research*: 2015; **6(5)**, 874-881.

3. S. Verma , **U Debnath**, P. Agarwal, K.Srivastava, Y. S. Prabhakar. " *In Silico* Exploration for New Antimalarials: Arylsulfonyloxy Acetimidamides as Prospective Agents." *Journal of Chemical information and Modelling:* 2015; **55(8)**,1708-19.

4. R. N. Kushwaha, **U. Debnath**, P. Singh, R. Saxena, S.K. Gupta, R. K. Tripathi, H. H.Siddiqui, S. B. Katti. "New piperazine-derived NNRTI's as anti-HIV agent: Synthesis, biological evaluation and molecular docking studies". *Indo American Journal of Pharm Research*. 2015; **5 (01)**, 408-421.

5. S. K. Kundu, **S. Chatterjee, A. Sen Gupta**. "Pharmacognostic evaluation and determination of appropriate methodology for extraction of important bioactive compounds of Aerva sanguinolenta leaves." *International Journal of Pharmacology and Pharmaceutical Sciences*: 2015; **2(4),** 11-20.

ii) Other Publications - There were a total of eighteen national proceedings and one international proceedings by the faculty members.

List of Conference Paper /Proceedings (International)

Sl No.	Title of the Abstract	Authors' Names	Title / Theme of the Conference/Seminar	National or International	Date	Venue
1	Threat on natural sustainability of the ecosystem and integrated management of resource recovery practice in East Kolkata Wetland area.	**Swati Chakraborty,** K.M. Agarwal, R.C. Srivastava	International Conference on Social issues and Social work: Public and Private	International	29th January, 2016	IISWBM, Kolkata

List of Conference Paper /Proceedings (National)

Sl No.	Title of the Abstract	Authors' Names	Title / Theme of the Conference/Seminar	National or International	Date	Venue
1	Dietary Phytomolecules significantly reduce oxidative stress of mononuclear cells of patients with Rheumatoid Arthritis: An *ex vivo* study	**Asis Bala,** Purbajit Chetia, Mainak Chakraborty, Bidita Khandewal, P.K. Haldar	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata
2	*In vitro* Antioxidant activity of Aerva sanguinolenta leaves obtained after different extraction process	**SamPat Kumar Kundu, S. Chatterjee, A. SenGupta**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata
3	Extraction and characterization of mucilage from the fruits of *Basella Alba L.* and its comparative study	**Moumita Chowdhury, Abhijit Sengupta, Sumana Chatterjee.**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata
4	Modeling the Biomass Growth and Enzyme	**Kausik Sen ,** Kannan Pakshirajan,	2nd National Convention of SFE on Integrated approaches for	National	Dec 5-6, 2015	Jadavpur University, Kolkata

	Secretion by the White Rot Fungus *Phanerocha ete chrysosporium*: a Stochastic-Based Approach	S. B. Santra	Promotion and development of Herbal medicine			
5	Design of pharmacophore acting on the different Glucose transporter systems in body	**Sourav Pal, Kausik Sen, Abhijit SenGupta, Sriparna KunduSen**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata
6	Evaluation of Antihyperglycemic Activity of *Citrus limetta* Fruit Peel in Streptozotocin-Induced Diabetic Rats	**Sriparna KunduSen, Prerona Saha**, Malaya Gupta, Upal K. Mazumder, Pallab K. Haldar	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata
7	Safety of Herbal Medicine: From prejudice to evidence	**D. Ghoshdasti da r**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata
8	Medicinal orchids of Darjeeling and Sikkim Himalaya as modern culture of Ethnopharmacolo gic al research.	S. Tuladhar, **A. Bala**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata

9	A review on Natural herbs in the treatment of hypertension.	**Samrat Bose**, K. Mitra	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur Universi ty, Kolkata
10	Effect & Toxicity relationship to fish production & human health: Implication for management waste water in East Kolkata Wetland.	**Swati Chakrabort y**	Frontier in Moder Biiology	National	Dec 5-6, 2015	IISER
11	Flavonoid containing plants having hepatoprotective activity-A review	**Anuranjita Kundu, Prerona Saha, Abhijit Sengupta**	Drug and Diseases: Role of Pharmacists and Doctors	National	16th Januar y, 2016	Jadavpur University, Kolkata
12	Antimicrobial activity of some plants containing essential oils- a review	**Jeenatara Begum, Anuranjita Kundu, Abhijit Sengupta**	Drug and Diseases: Role of Pharmacists and Doctors	National	16th Januar y, 2016	Jadavpur University, Kolkata
13	Antimicrobial activity of *terminalia bellerica* against multi drug resistant *Staph. aureus*.	**Tamalika Chakraborty, Sumana Chatterjee, Lopamudra Datta, Abhijit**	Drug and Diseases: Role of Pharmacists and Doctors	National	16th Januar y, 2016	Jadavpur University, Kolkata

		Sengupta				
14	Comparative antidiabetic study of different parts of *c. maxima*	**Prerona Saha,** U.K. Mazumder, P.K.Haldar	Drug and Diseases: Role of Pharmacists and Doctors	National	16th January, 2016	Jadavpur University, Kolkata
15	Formulation and characterization of w/o/w multiple emulsions with various activities	**Sumana Roy**	Drug and Diseases: Role of Pharmacists and Doctors	National	16th January, 2016	Jadavpur University, Kolkata
16	Comparative study of the properties of natural mucoadhesive from fruit pulp of *Ziziphus maurituana* with HPMC and sodium alginate	**Priyanka Ray, Sumana Chatterjee, Prerona Saha**	Drug and Diseases: Role of Pharmacists and Doctors	National	16th January, 2016	Jadavpur University, Kolkata
17	Evaluation of antitumor activity and antihyperglycemic effects of *Citrus maxima* (Burm.)Merr. Leaves	**Sriparna Kundu Sen, Prerona Saha,** M. Gupta, U.K.Mazumder, P.K. Haldar	Drug and Diseases: Role of Pharmacists and Doctors	National	16th January, 2016	Jadavpur University, Kolkata
18	Pharmacognostic and antioxidant activities of different extracts of *Aerva sanguinolenta* leaves	**Sampat Kumar Kundu, Sumana Chatterjee, Abhijit Sengupta**	Drug and Diseases: Role of Pharmacists and Doctors	National	16th January, 2016	Jadavpur University, Kolkata

iii) Research & Development Grant

- ✓ There is an ongoing AICTE funded Rapid Promotion Scheme (RPS) project in the institute under Dr. Lopamudra Datta.
- ✓ Dr. Swati Chakraborty received a grant of 20 lakhs from West Bengal DST for a Project titled "**Identification of heavy metal chromium and nickel tolerance bacteria to develop microbial biosensor and their role on secondary metabolite of medicinal plant *Bacoppa monnnieri* in metal contaminated soil of east Kolkata wetland."**
- ✓

Sl No.	Name of faculty	Name of the Project	Name of the funding Agency	Total grant Received
1.	Dr. Abhijit Sengupta & Dr.Asis Bala	**Evaluation of the effect of GSH (R) and NAC on L Arginine and 5Fu co cultured Ehrlich Ascites Carcinoma cells (EAC)**	**Guru Nanak Educational Trust**	15000
2.	Dr. Abhijit Sengupta & Dr. Lopamudra Datta	**Isolation of active fractions *of Bauhuniaacuminata* responsible for antidiabetic activity in experimental animals**	**Guru Nanak Educational Trust**	15000
3.	Dr. Asis Bala & Dr. Abhijit Sengupta	**Isolation of active fractions of Areca catechu nut responsible for its anticancer activity in cancer cell line**	**Guru Nanak Educational Trust**	15000
4.	Dr. Asis Bala & Dr. Prerona Saha	**Evaluation of anti-inflammatory and antioxidant activity of different phytomolecules on isolated Human Red blood Cell**	**Guru Nanak Educational Trust**	15000
5.	Dr. Prerona Saha and Dr. Asis Bala	**Identification of the active antioxidant and anti-inflammatory fractions of *syzygiumsamarangense.***	**Guru Nanak Educational Trust**	15000
6.	Dr. Lopamudra Datta & Mr. Debabrata Ghosh Dastidaar	**Preparation and evaluation of herbal tablet for asthma.**	**Guru Nanak Educational Trust**	15000

7.	Mr. Jaydip Ray and Mr. Debabrat GhoshDastidaar	**Preparation and evaluation of Ferrous salt & Folic acid tablet**	**Guru Nanak Educational Trust**	15000
8.	Dr. SumanaChattedrjee & Mr. Debabrata GhoshDastidaar	**Preparation and evaluation of tablet of Dexamethasone dispersed in PEG. (improvment of biopharmaceutical property).**	**Guru Nanak Educational Trust**	15000
9.	Dr. Abhijit Sengupta& Mr. Debabrata Ghoshdastidaar	**Preparation and evaluation of Dexamethasone loaded Self Emulsifying Drug Delivery System in form of Tablet**	**Guru Nanak Educational Trust**	15000
10.	Mr. Debabrata GhoshDastidaar	**Prepartion and evaluation of Probiotic delivery system.**	**Guru Nanak Educational Trust**	15000
11.	Mr. Debabarata Ghosh Dastidaar& Mrs. Sumana Roy	**Preparation and evaluation of Ofloxacin and Metronidazole loaded Transdermal Patch.**	**Guru Nanak Educational Trust**	15000
12.	Dr. Prerona Saha& Mr. Debabrata Ghoshdastidaar	**Preparation and evaluation of microparticulate drug delivery system**	**Guru Nanak Educational Trust**	15000
13.	Dr. Abhijit Sengupta& Mr. Debabrata GhoshDastidaar	**Preparation and evaluation of drug loaded lipid microparticle**	**Guru Nanak Educational Trust**	15000
14.	Dr. AsisBala &Mr. Debabrata GhoshDastidaar	**Preparation and evaluation of semisolid base from natural source (aleovera gel) for the delivery of curcumin**	**Guru Nanak Educational Trust**	15000

e) **PH.D DETAILS**

The following faculty member has enrolled for PhD under Moulana Abul Kalam Azad University of Technology .

NAME OF FACULTY ENROLLED FOR PHD				
Sl. No	Name of Faculty	Dept.	Collaborative Institute With Enrolment Date	Area Of Research
1	Mr. Sampat Kumar Kundu	Pharmaceutical Technology	Moulana Abul Kalam Azad University of Technology .	Phytochemistry, Pharmacology, Pharmaceutics

The following faculty members of the institute are already registered and are doing their research work at the institute itself.

LIST OF FACULTIES REGISTERED FOR PH.D.				
Sl. No	Name Of Faculty	Date Of Joining	Dept.	Collaborative Institute
1	Mr. Jaydip Ray	04/04/05	Pharmaceutical Technology	Siksha O Anusandahan University, Orissa
2	Mr. Debabrata GhoshDastidaar	15/07/09	Pharmaceutical Technology	Calcutta University
3	Ms. Sumana Roy	04/09/2008	Pharmaceutical Technology	Moulana Abul Kalam Azad University of Technology .
4	Ms. Anuranjita Kundu	04/09/2008	Pharmaceutical Technology	Moulana Abul Kalam Azad University of Technology .
5	Mr. Abir Koley	01/07/2011	Pharmaceutical Technology	Moulana Abul Kalam Azad University of Technology .
6	Mr. Soumya Bhattacharya	01/07/2011	Pharmaceutical Technology	Moulana Abul Kalam Azad University of Technology .
7	Ms.Priyanka Ray	18/10/2011	Pharmaceutical Technology	Moulana Abul Kalam Azad University of Technology .

The following faculty member of the institute has submitted his PhD thesis and is awaiting award of degree.

Sl. No	Name of Faculty	Dept.	Collaborative Institute With Enrolment Date	Area Of Research
1	Mr. Utsab Debnath	Pharmaceutical Technology	CDRI, Lucknow	Computaer Aided Drug Design

2) STUDENTS RELATED INFORMATION

a) ADMISSION DATA

  i. A total of 120 students took admission in B.Pharm. through West Bengal Joint Entrance Examination (WBJEE),Joint Entarnce Examination (Main) [JEE (Main)] and Common Entrance Examinations- Association of Minority Professional Institutes (CEE-AMPAI).

  ii. A total of 17 students took admission in M.Pharm through GPAT and Post Graduate Entrance Test (PGET) organized by West Bengal University of Technology (WBUT).

b) **RESULT ANALYSIS**

SUBJECT WISE RESULT ANALYSIS ODD SEM 2015-16

B.PHARM. 1ST YEAR 1ST SEMESTER

	Dispensing Pharmacy	Dispensing Pharmacy Lab	PHARM ANALYSIS	PHARM ANALYSIS LAB	Rem. Biology (Elective)	Rem. Biology Lab.	INORGANIC CHEMISTRY	INORGANIC CHEMISTRY LAB	Profesional communication in English
	PT 106	PT 196	PT 101	PT 191	PTB101/M-103	PTB191	PT 103	PT 193	HU-101
BELOW 6	59	4	88	10	84	8	69	6	36
6.01-7.00	29	15	23	3	14	22	31	25	50
7.01-8.00	22	41	9	36	13	46	17	48	33
8.01-9.00	11	42	1	61	10	37	4	32	2
ABOVE 9.00	0	19	0	11	0	8	0	10	0

B.PHARM 2ND YEAR 3RD SEMESTER

	Pharm. Analysis	Pharm. Analysis Lab	Organic Chemistry	Organic Chemistry Lab	Physical Pharmacy	Physical Pharmacy Lab	Pharm. Engg	Pharm. Engg Lab	Physiology	Basic Electronics and Computer Application	Basic Electronics and Computer Application Lab
	PT 301	PT 391	PT 304	PT 394	PT306	PT396	PT 307	PT 397	PT 305	CS-303	CS-393
BELOW 6	67	2	60	2	27	3	62	4	24	98	3
6.01-7.00	27	14	26	14	18	11	23	33	45	18	7
7.01-8.00	17	49	21	24	43	51	23	39	36	2	41
8.01-9.00	8	45	9	71	27	49	11	40	14	1	51
ABOVE 9.00	0	9	3	8	4	5	0	3	0	0	17

B.PHARM 3RD YEAR 5TH SEMESTER

	MEDICINAL CHEMISTRY	MEDICINAL CHEMISTRY LAB	BIOCHEMISTRY	Pharmacology	Pharm Engg	Pharm Engg Lab	Pharm microbiology	Pharm. Microbiology Lab	Pharm Tech II	Pharm Tech II Lab
	PT 503	PT 593	PT 504	PT 508	PT- 507	PT-597	PT 509	PT 599	PT506	PT596
BELOW 6	41	4	22	40	36	0	23	0	19	2
6.01-7.00	33	5	26	31	37	11	28	1	35	5
7.01-8.00	25	38	31	29	33	43	42	20	27	48
8.01-9.00	8	46	26	9	3	45	16	60	25	51
ABOVE 9.00	2	16	4	0	0	10	0	28	3	3

B.PHARM. 4th Year 7th Semester

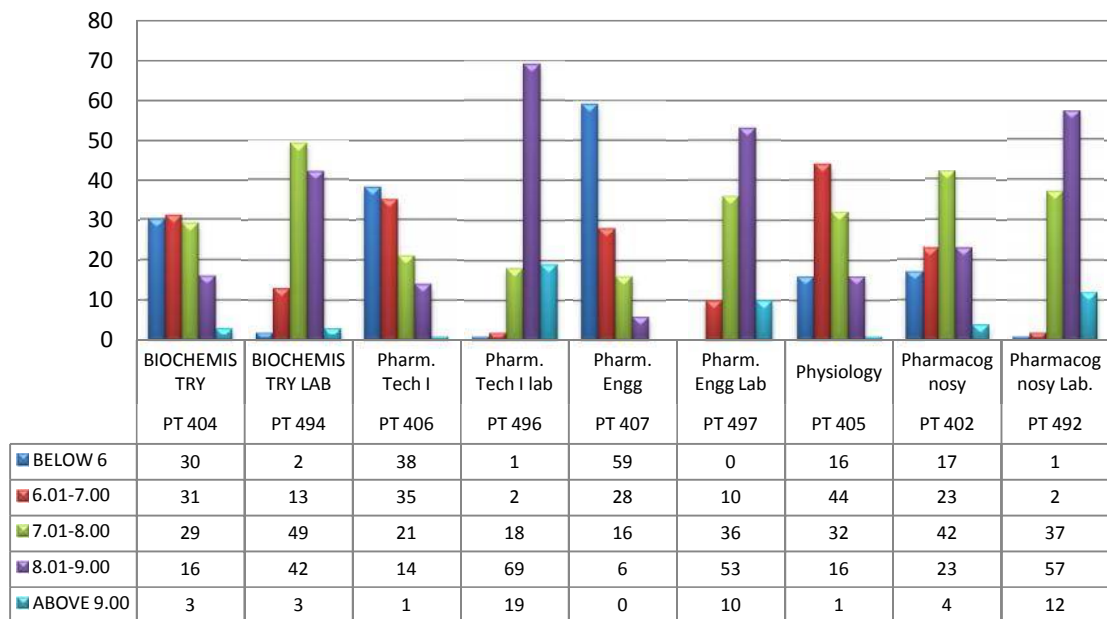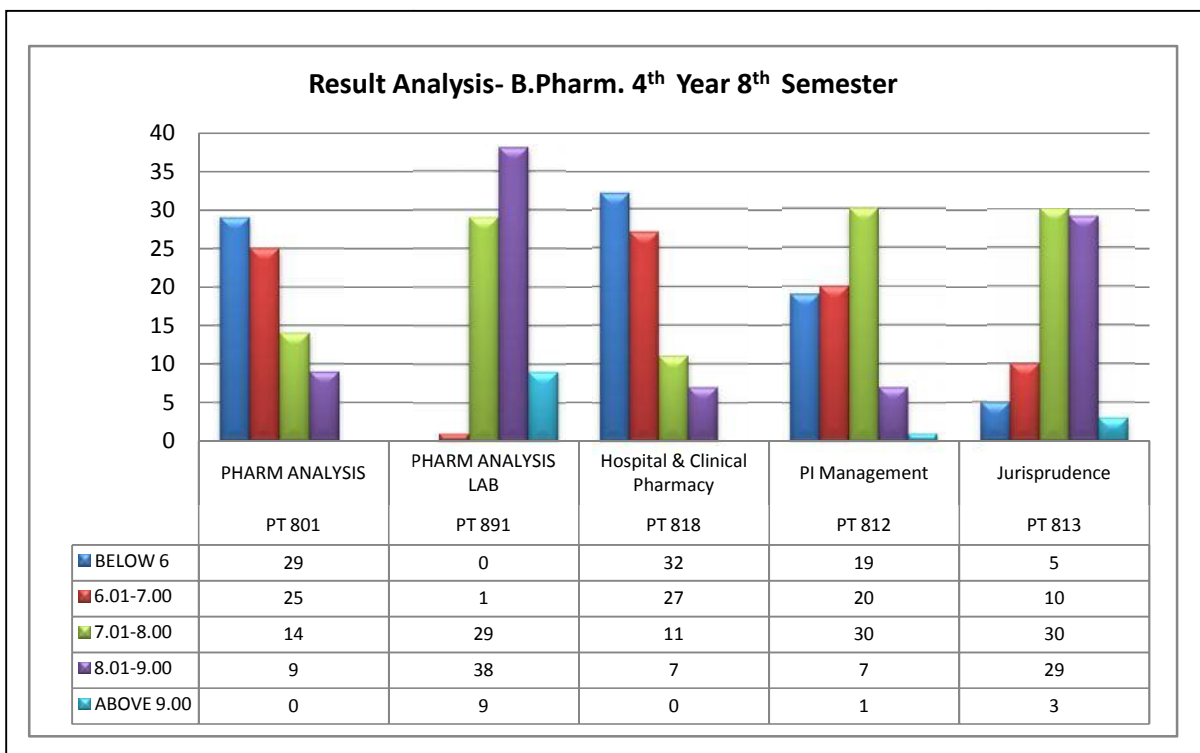|	Pharmaceutics	Pharmaceutics Lab	Pharmacology	MEDICINAL CHEMISTRY	MEDICINAL CHEMISTRY LAB	Pharmacognosy	PT-709 A/B/C	Seminar on assigned topic	Project
	PT -706	PT 796	PT 708	PT 703	PT 793	PT 702		PT-782	PT-783
BELOW 6	94	4	49	54	0	45	20	0	0
6.01-7.00	33	14	33	41	8	45	46	0	0
7.01-8.00	7	49	33	23	80	22	44	36	35
8.01-9.00	1	44	17	13	33	20	25	56	56
ABOVE 9.00	0	24	3	4	14	3	1	43	44
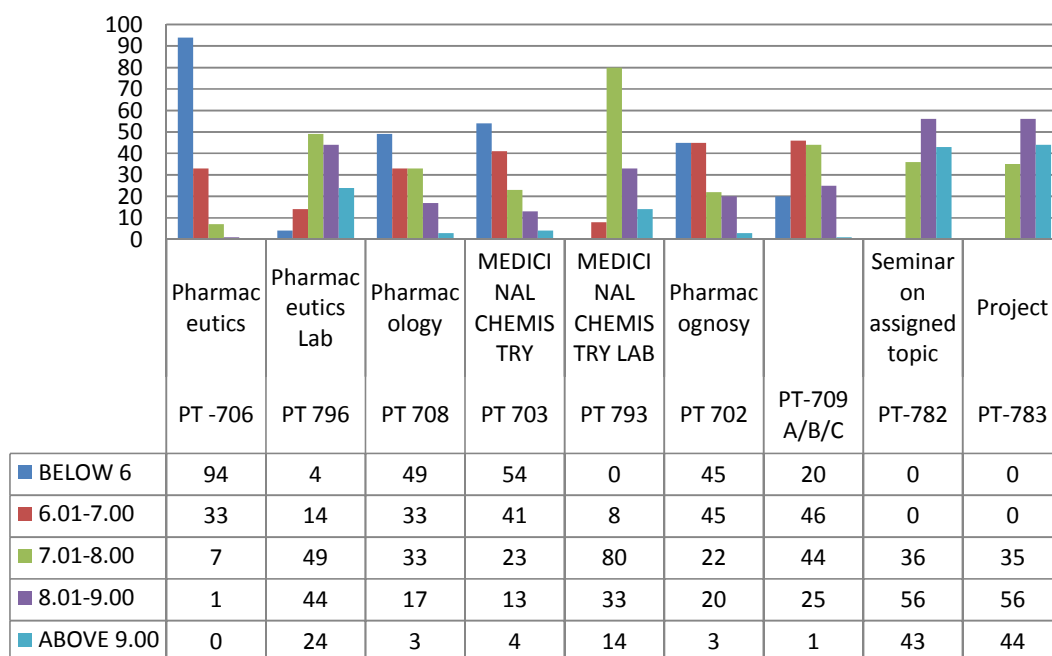
SUBJECT WISE RESULT ANALYSIS EVEN SEM 2014-15

Result Analysis- B.Pharm. 1st Year 2nd Semester

	ORGANIC CHEMISTRY PT 204	ORGANIC CHEMISTRY LAB PT 294	PHYSICAL CHEMISTRY PT 203	PHYSICAL CHEMISTRY LAB PT 293	Physiology PT 205	Physiology Lab PT 295	Pharmacognosy PT 202	Pharmacognosy Lab. PT 292
BELOW 6	61	0	43	0	30	1	29	0
6.01-7.00	24	4	20	3	39	15	33	14
7.01-8.00	13	26	24	17	23	46	18	39
8.01-9.00	2	42	12	55	8	30	16	39
ABOVE 9.00	0	28	1	25	0	8	4	8

B.Pharm. 2nd Year 4th Semester

	BIOCHEMISTRY PT 404	BIOCHEMISTRY LAB PT 494	Pharm. Tech I PT 406	Pharm. Tech I lab PT 496	Pharm. Engg PT 407	Pharm. Engg Lab PT 497	Physiology PT 405	Pharmacognosy PT 402	Pharmacognosy Lab. PT 492
BELOW 6	30	2	38	1	59	0	16	17	1
6.01-7.00	31	13	35	2	28	10	44	23	2
7.01-8.00	29	49	21	18	16	36	32	42	37
8.01-9.00	16	42	14	69	6	53	16	23	57
ABOVE 9.00	3	3	1	19	0	10	1	4	12

Result Analysis- B.Pharm. 3rd Year 6th Semester

	Medicinal Chemistry PT 603	Medicinal Chemistry Lab PT 693	Pharmaceutics PT 606	Pharmaceutics Lab PT 696	Biopharmaceutics PT 611	Biopharmaceutics lab PT 697	Biotechnology PT 609	Pharmacology PT 608	Pharmacology Lab PT 698
BELOW 6	83	1	34	5	64	3	79	57	6
6.01-7.00	24	15	33	10	42	2	32	36	12
7.01-8.00	20	63	43	78	14	74	17	29	47
8.01-9.00	9	50	24	40	16	53	8	9	50
ABOVE 9.00	1	8	3	4	1	5	1	6	22

Result Analysis- B.Pharm. 4th Year 8th Semester

	PHARM ANALYSIS PT 801	PHARM ANALYSIS LAB PT 891	Hospital & Clinical Pharmacy PT 818	PI Management PT 812	Jurisprudence PT 813
BELOW 6	29	0	32	19	5
6.01-7.00	25	1	27	20	10
7.01-8.00	14	29	11	30	30
8.01-9.00	9	38	7	7	29
ABOVE 9.00	0	9	0	1	3

COMPARATIVE RESULT ANALYSIS (SGPA) OF STUDENTS OF 2012-16 BATCH

	1st	2nd	3rd	4th	5th	6th	7th	8th
9.01-10.0	0	1	4	5	4	9	12	9
8.01-9.00	26	19	29	34	25	25	38	37
7.01-8.00	42	35	43	40	27	58	67	76
6.01-7.00	20	26	35	24	50	31	16	15
below 6	12	19	19	5	31	14	4	0

COMPARATIVE RESULT ANALYSIS (10+2 and B.PHARM) OF STUDENTS OF 2012-16 BATCH

	<60	61-70	71-80	81-90
10+2	87	28	18	4
B.Pharm.	9	15	76	37

c) **SUMMER TRAINING**

A total of 114 students of B. Pharm. did their summer training in different reputed Pharmaceutical companies both within and outside the state of West Bengal. The list is as following-

	Summer Training	
Sl.No.	Name of the Company	No of Students
1.	Dey's Medical Stores Mfg. Ltd.	14
2.	Caplet India Pvt. Ltd.	07
3.	Emami Ltd	02
4.	Bengal Chemicals and Pharmaceuticals Ltd.	23
5.	Albert David Ltd.	04
6.	Pasteur Laboratories Pvt. Ltd	03
7.	Emcee Pharmaceuticals	14
8.	B.V Patel Pharmaceutical Education & Research development Center	11
9.	Green Co Biologicals PVT. LTD	04
10.	AurioPharma Laboratories PVT LTD	09
11.	Zydus Wellness Sikkim	02
12.	Kalidac Group	05
13.	EskagPharma PVT.LTD	09
14.	Standard Pharmaceutical LTD	01
15.	Burnet Pharmaceuticals (P) Ltd.	02
	TOTAL	114

d) PLACEMENT RECORDS

The Training and Placement Cell of the Institute organized different on and off Campus interviews over the year. Twenty three students were placed in different companies in this academic year. The list is as following

	PLACEMENT RECORDS 2015-16		
SL NO	COMPANY VISITED	NUMBER OF STUDENT APPEARED/APPLIED	NUMBER OF STUDENT SELECTED
1	DR. LAL PATH LAB	64	4
2	APOLLO PHARMACY	36	22
3	ABBOTT INDIA	74	03
4	HETERO DRUGS	10	02
5	ERIS LIFE SCIENCES	01	01
6	GOVT PHARMACIST	4	04
7	OPTIVAL HEALTH SOLUTIONS PVT. LTD. (MEDPLUS)	21	21
8	NESTLE INDIA	29	02
9	GSK PHARMACEUTICAL LTD	05	03
10	CLINICAL TRIAL (SUN)	02	01
11	LUPIN	01	01
12	SUN KNOWLEDGE	05	01
13	ONCOLOGY GROUP	01	01
14	UNITED BIOTECH	02	01
15	STANDARD PHARMACEUTICALS	04	01
Total			68

e) **INDUSTRY VISIT**

Industry visits were organized by the college for second year B.pharm. students. The students visited East India Pharmaceutical works in two batches each comprised of 60 students.

f) **SEMINAR / WORKSHOP ATTEND BY STUDENTS**

The B. Pharm., M. Pharm. and research students presented their works at different conferences and seminars. The list is given below.

	Conference & Seminar Publication of Students					
Sl No.	Title of the Abstract	Authors' Names	Title / Theme of the Conference/ Seminer	National or International	Date	Venue
1	Medicinal orchids of Darjeeling and Sikkim Himalaya as modern culture of Ethnopharmacologic al research.	S. Tuladhar, **A. Bala**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata
2	Design of pharmacophore acting on the different Glucose transporter systems in body	**Sourav Pal, Kausik Sen, Abhijit SenGupta, Sriparna KunduSen**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	National	Dec 5-6, 2015	Jadavpur University, Kolkata

g) STUDENTS ACHIEVEMENT

a) ACADEMIC ACHIEVEMENT

The students of GNIPST appeared in Graduate Pharmacy Aptitude Test (GPAT), Post Graduate Entrance Test (PGET) conducted by Maulana Abul Kalam Azad University of Technology..

The details of the students who opted for higher studies in the academic year of 2015-16 are given in the list below.

| Name	CAT, GPAT, GRE Qualified	Higher Studies	Year
Diksha Kumari	GPAT QUALIFIED	Studying in Jadavpur University	2015
Rupanjay Bhattacharya	GPAT QUALIFIED	Studying in Jadavpur University	2015
Abhik Paul	GPAT QUALIFIED	Studying in Kolkata NIPER	2015
Ranit Kundu	PGET QUALIFIED	Studying at GNIPST	2015
Sayeri nanadi	PGET QUALIFIED	Studying at GNIPST	2015
Moumita Basak	PGET QUALIFIED	Studying at GNIPST	2015
Abhishek manna	PGET QUALIFIED	Studying at GNIPST	2015
Dipesh Hazra	PGET QUALIFIED	Studying at GNIPST	2015
Madhurima Mazumder	PGET QUALIFIED	Studying at GNIPST	2015
Madhurima Saha	PGET QUALIFIED	Studying at GNIPST	2015
Sankha Saha	PGET QUALIFIED	Studying at GNIPST	2015
Aindrila Guha	PGET QUALIFIED	Studying at GNIPST	2015
Sanhu Praharaj	PGET QUALIFIED	Studying at GNIPST	2015
Sweta Mazumder	PGET QUALIFIED	Studying at GNIPST	2015
Rahaman Mehadi Mamud	PGET QUALIFIED	Studying at GNIPST	2015
Deolina Dey	PGET QUALIFIED	Studying at GNIPST	2015
Aishika Datta	GPAT QUALIFIED	Will go for higher studies	2016
Mainak Chatterjee	GPAT QUALIFIED	Will go for higher studies	2016
Debanjana Das	GPAT QUALIFIED	Will go for higher studies	2016
Soumya Guha	GPAT QUALIFIED	Will go for higher studies	2016
Himadrija Chatterjee	GPAT QUALIFIED	Will go for higher studies	2016
Evana Patra	GPAT QUALIFIED	Will go for higher studies	2016
Debolina Datta	GPAT QUALIFIED	Will go for higher studies	2016
Aheli Mukherjee	GPAT QUALIFIED	Will go for higher studies	2016
Indira Saha	GPAT QUALIFIED	Will go for higher studies	2016
Priyanka De	GPAT QUALIFIED	Will go for higher studies	2016

b) *DIFFERENT EXTRACURRICULAR ACTIVITIES*

The Annual Cricket Tornament of GNIPST was held on 29th and 30th January, 2016.

- The winners wer **B.Pharm. 2nd Year**
- The Runers up were **B.Pharm 4th Year.**
- The Man of the Tournament was **Gourab Dey** of B.Pharm 4th Year
- Best Batsman was **Sumel Ashique** of B.Pharm 2nd Year.

The Annual Football Tornament of GNIPST was held on9th and c10th October, 2015

- The winners wer **B.Pharm. 2nd Year**
- The Runers up were **B.Pharm 4th Year.**
- The Man of the Tournament was Smaranjit Banik of B.Pharm 4th Year
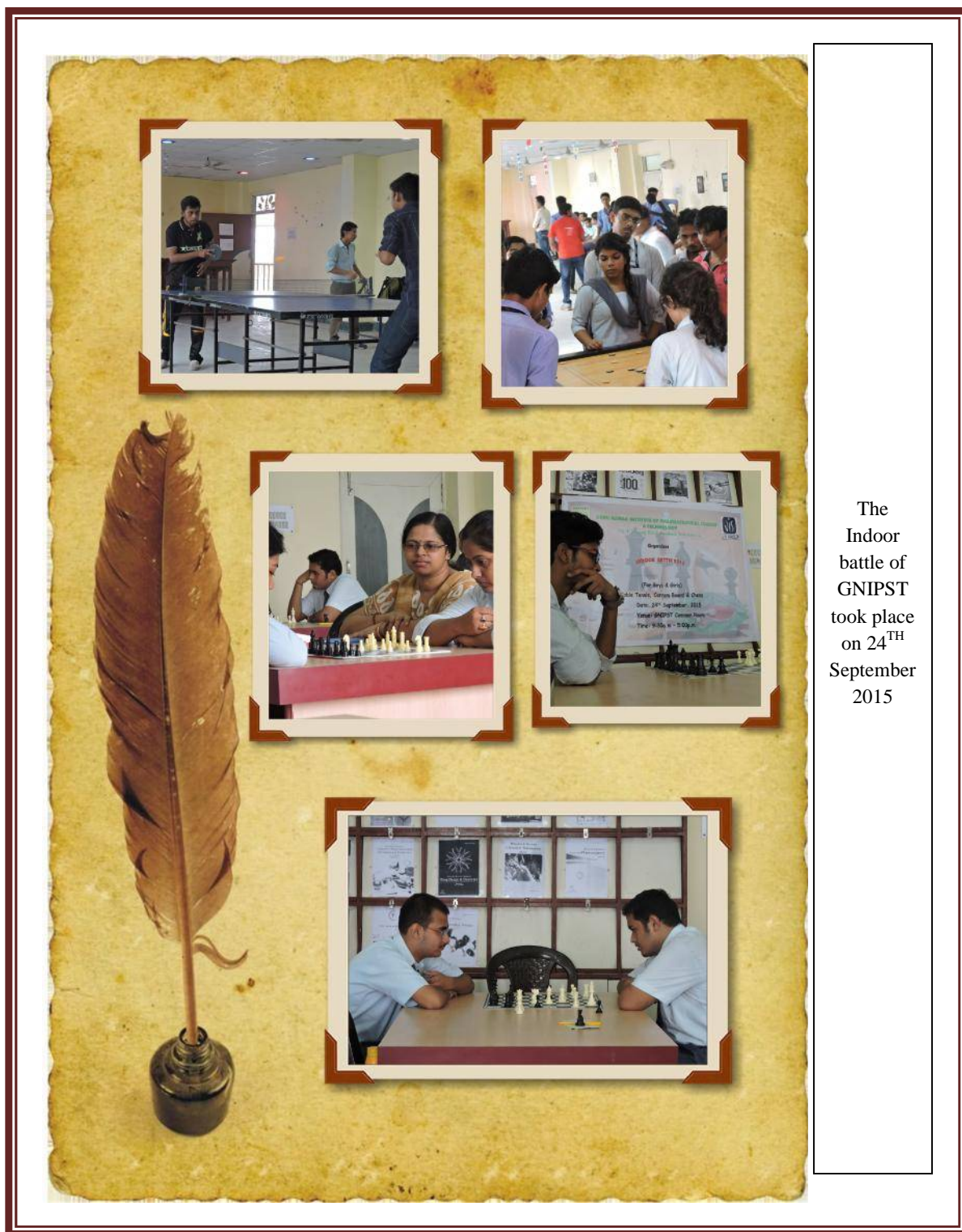
The Indoor battle of GNIPST took place on 24TH September 2015

INTRACOLLEGE ANNUAL SPORTS MEET

The intracollege Annual Sports Meet held on 27th and 28th January, 2016.

The events were 100 meter flat race (Girls), 100 meter flat race (Boys), Three legged race (Girls), 200 meter flat race (Girls), Long Jump (Boys), Skipping (Girls), Shotput (Girls), Shotput (Boys), Discuss Throw(Girls),   Long Jump (Girls), 200 meter flat race (Boys),Sack race (Girls), Sack race (Boys), Relay race (Boys), Relay race (Girls), Go for Goal (Boys), Tug of war (Boys) and Tug of war (Girls).

The results of Intracollege Annual Sports meet held on 27th and 28th January, 2016 are as follows.

Name of Event	1st	2nd	3rd
100 meter flat race (Girls)	Nirmita Gupta	Joyati Ghosh	Moutan Roy
100 meter flat race (Boys)	Abu Sufian	Maruf Billa Akunjee	Arijit Mitra Thakur
200 meter flat race (Girls)	Anjali Mondal	Moutan Roy	Nirmita Gupta
200 meter flat race (Boys)	Maruf Billa Akunjee	Subhrajit Majumder	Arijit Mitra Thakur
Long Jump (Boys)	Abu Sufian	Maruf Billa Akunjee	Dipankar Kamila
Skipping (Girls)	Aindrila Bhowmick	Anjali Mondal	Manpreet Ghai
Shotput (Girls)	Koel Ghosh	Nirmita Gupta	Sneha Paul
Shotput (Boys)	Arijit Mitra Thakur	Vishal Kr. Singh	Rohan Datta
Musical Chair (Staff)	Mr. Abir Koley	Ms. Priyanka Ray	Mr. Debabrata Ghoshdastidar
Discuss Throw(Girls)	Manpreet Ghai	Nirmita Gupta	Sneha Paul
Discuss Throw (Boys)	Bishal Kumar Singh	Raj Kumar	Arijit Mitra Thakur
Balance race (Girls)	Indira Saha	Nirmita Gupta	Aindrila Bhowmick
Long Jump (Girls):	Aindrila Bhowmick	Manpreet Ghai	Anjali Mondal
200 meter flat race (Boys):	Dipankar Kamila	Arijit Mitra Thakur	Kaustav Sakar
Sack race (Girls)	Nirmita Gupta k	Aindrila Bhowmic	Moutan Roy
Sack race (Boys)	Maruf Billa Akunjee	Abu Sufian	Sufian Sk.
Relay race (Boys)	Maruf Billa Akunjee, Somenath Dian, Subhajit Majumdar, Abu Sufian		
Relay race (Girls)	Joyoti Ghosh, Aindrila Bhowmick, Anjali Mondal, Manpreet Ghai		
Go for Goal (Boys)	Rohan Datta	Souvik Ganguly	Ankit choudhury

Tug of war (Boys)	Dipu Roy, Vishal Kr.Singh,, Doyal Hui, Rohan Dutta, Ankit Dey
Tug of war (Girls)	Indira Saha, Manpreet Ghai, Sneha Paul, Joyati Ghosh, Deblina Roy

DIFFERENT SPORTS EVENTS AT GNIPST

c) DIFFERENT CULTURAL EVENTS ORGANISED IN THE INSTITUTE BETWEEN JULY, 2014 TO JUNE 2015

The cultural club and the committee of the college under the aegis of "Student Life Centre" organized different cultural programs in the academic year of 2014-15.

Date	Name of Function	Venue	Brief Description
14.08.15	Fresher's welcome	GNIPST auditorium	The fresher's welcome was organized by the cultural committee. All the freshers students were welcomed by the senior students. Various cultural performance such as song, Dance ,Skit ,Band performance etc. were presented by the students. Mr.Fresher and Ms.Fresher were awarded.
6.11.15	Bijaya sammillani	GNIPST auditorium	The Bijaya Sammillini was organized in the college auditorium. The auditorium was decorated beautifully. Various game shows such as Candle lighting, Sankha Dhwani, identifying the puja pandal etc. were organized both for faculty and students. Several students performed during the program.
28.2.16	Reunion	GNIPST Campus	The reunion ceremony was held in the GNIPST college lobby. Many ex-students attended the reunion. They had good interaction with all the faculty members and present students. They also filed up their present details in the Reunion register.
11.3.15 to 13.03.15	Fest	GNIPST Campus	The GNIPST Tech Fest and Cultural fest was organized by the cultural committee in Collaboration with Scientific committee and Social welfare Committee. Several competitions took place during the fest such as innovative modeling, debate competition, Painting,Solo singing, band performance, Fashion show etc. Students enjoyed a lot as everything was carried out smoothly.
25.5.16	Farewell function	GNIPST auditorium	The outgoing batch of B.Pharm was bid farewell by the juniors at the College Auditorium. The students participated in various cultural programs and they had a good interactive session with the outgoing seniors by sharing their memories of GNIPST college life.

DIFFERENT CULTURAL ACTIVITIES IN THE INSTITUTE

d) DIFFERENT WELFARE EVENTS ORGANISED IN THE INSTITUTE BETWEEN JULY, 2015 TO JUNE 2016

The social welfare committee and social welfare club of the Institute under the aegis of "Student Life Centre" organizes various programs all throughout the year.

The different programs organized by social welfare committee in the year of 2015-15 are given below.

Semester	Programme	Venue	Date
Even Semester 2016	National Youth Day	GNIPST	12.01.2016
	Blood Donation Camp	GNIPST	04.03.2016
	Eye checking camp	GNIPST campus	28.04.2016
Odd Semester 2015	Swach Bharat Abhiyan	GNIPST campus	25.09.2015
	Run for Unity	GNIPST campus	30.10.2015

SWACH BHARAT ABHIYAN 2015

RUN FOR UNITY 2015

NATIONAL YOUTH DAY, 2016   **BLOOD DONATION CAMP, 2016**

GNIPST -Student Life centre

Guru Nanak Institute of Pharmaceutical Science and Technology has proudly constituted Student Life Centre with immediate effect. Student Life Centre aims at all round development of students by organizing several extracurricular activities throughout the year by various clubs at the college campus. Through STUDENT LIFE CENTRE, there will be a steady growth in students' participation at various levels, where they will get an opportunity to demonstrate their skills and talents in the fields of sports, dance, music, photography, social service etc.

Objective: Assisting the student for exploring their innovativeness & activities related to various technological and non-technological aspects in order to enhance their hidden talent and creativity.

The Clubs under SLC are as follows:p

Serial Number	Name Of The Members	Designation
1.	Dr. Asis Bala	Coordinator, Social Services Club
2.	Mr. Soumya Bhattacharya	Coordinator Debate And Extempore Club
3.	Mr. Debabrata Ghosh Dastidar	Coordinator Sports Club
4.	Mr. Samrat Bose	Coordinator, Science And Innovative Modelling

5.	Mr. Abir Koley	Coordinator, Photography
6.	Ms. Sumana Roy	Coordinator, Eco Club
7.	Ms. Priyanka Ray	Coordinator, Cultural Club
8.	Ms. Jeenatara Begum	Coordinator Literary And Painting

Various activities are initiated by the above mentioned clubs and societies. Some of the activities that were initiated are as follows:

1. Workshops & Seminars
2. Annual Sports
3. Intra and Inter college academic competitions
4. Debates & Quizzes
5. Exhibitions
6. Industry Visits
7. Campus Beautification Program
8. Social Service
9. Intra and Inter college non-academic competitions
10. Cultural Programmes

CULTURAL CLUB

- Coordinator :Ms. Priyanka Ray
- Student Coordinator: Sumana Saha, B. Pharm 4th year

DEBATE & EXTEMPORE CLUB

- Coordinator :Mr. Soumya Bhattacharya
- Student Coordinator: Anirban Roy,B. Pharm 4th year

ECO CLUB

- Coordinator:Ms. Sumana Roy
- Student Coordinator: Debarati Bhattacharya,B. Pharm 3rd year

INNOVATIVE AND SCIENTIFIC MODELLING

- Coordinator : Mr. Samrat Bose
- Student Coordinator: Dipesh Hazra , M. Pharm 1st year

LITERARY AND PAINTING CLUB

- Coordinator :Ms. Jeenatara Begum
- Student Coordinator: Indira Saha, B. . Pharm 4th year

PHOTOGRAPHY CLUB

- Coordinator : Mr. Abir Koley
- Student Coordinator:Dipesh Hazra , M. Pharm 1st year

SOCIAL SERVICE CLUB

- Coordinator : Dr. Asis Bala
- Student Coordinator: Abhinandan Mondal, B.Pharm. 4th Year

SPORTS CLUB

- Coordinator :Mr. Debabrata Ghosh Dastidar
- Student Coordinator: Aditya Sen, B.Pharm. 4th Year

3) **FACULTY ACHIEVEMENTS**

DIFFERENT FACULTY MEMBERS IN EDITORIAL BOARD OF JOURNALS

Sl.No.	Name of the faculty	Name of the Journal
1.	Dr. Asis Bala	Pharmacologia, (ISSN 2044-4648)
2.	Dr. Swati Nandi	Krishi Samachar

- Ms. Tamalika Charaborty, who is working under the guidance of Dr. Sumana Chatterjee and Dr Lopamudra Datta has enrolled for Ph.D degree from Maulana Abul Kalam Azad University of Technology.

- Mr. Sampat Kumar Kundu is working under the guidance of Dr. Abhijit Sengupta and Dr. Sumana Chatterjee t and has enrolled for PhD under Maulana Abul Kalam Azad University of Technology.

    Ms. Priyanka Ray is continuing her PhD under the guidance of Dr. Sumana Chatterjee and Dr.Preona Saha and is enrolled under Maulana Abul Kalam Azad University of Technology.

- Ms. Sumana Ray is doing her PhD under the guidance of Dr. Lopamudra Datta and Dr. Prerona Saha and is enrolled under Maulana Abul Kalam Azad University of Technology.

    Ms. Anuranjita Kundu is continuing her PhD under the able guidance of Dr. Abhijit Sengupta and Dr. Prerona Sahaand is enrolled under Maulana Abul Kalam Azad University of Technology.

    Mr. Abir Koley is doing his PhD research work under the able guidance of Dr. Abhijit Sengupta and Dr. Lopamudra Dattaand is enrolled under Maulana Abul Kalam Azad University of Technology.

- Mr. Soumya Bhattacharya is doing his PhD. Research work under the able guidance of Dr. Lopamudra Datta and Dr. Sriparna KunduSen and is enrolled under Maulana Abul Kalam Azad University of Technology.

- Dr. Sriparna KunduSen and Dr. Asis Bala acted as reviewers for "Pharmaceutical Biology".

- Dr. Asis Bala acted as reviewer for "Journal of Ethnopharmacology

- Dr Asis Bala was awarded best oral presentation at the **"2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine"**

Academics

a) **Departmental Lab wise details of equipment**

  ➢ **Department of Pharmaceutical Technology**

The Institute procured a variety of instruments in the academic year of 2015-16. The net value of the items procured was Rs.721,742.00/-The list of procurements is given bellow.

Item Name	Quantity	Rate (In Rs.)	Amount (in Rs.)
DEHUMIDIFIER - REFRIGERATION (RH 40%)	1.00	6825.00	68250.00
STABILIZER 5 KVA	2.00	10877.00	21754.00
ROCHE FRIABILATOR	3.00	16695.00	50085.00
DIGITAL BALANCE	9.00	4515.00	40635.00
STABILITY CHAMBER	1.00	80503.69	80503.69
BROOKFIELD RHEOMETER	1.00	219240.37	219240.37
PH METER	3.00	5044-.00	15132.00
VACCUM PUMP	5.00	9729.36	48646.80
HARDNESS TESTER	1.00	7875.00	7875.00
COMPUTER SET	20	32718.00	654360.00
EMULSIFIER	1.00	47994.90	47994.90
S.S VAT (150 L CAPACITY)	1.00	15831.63	15831.63
STORAGE TANK (100L CAPACITY)	1.00	14248.40	14248.40
REFRIGERATOR	3.00	33907.00	101721.00
SOFTWARE- CHEM-OFFICE PROFESSIONAL	1.0	167300.00	167300.00
SOFTWARE- ANIMAL SIMULATOR	2.0	60113.00	120226.00
TOTAL			1671458.00

b) **Library Books & Journals**

There is a total number of 1169 titles and a total of 9241 volumes present in the library. The institute subscribes 16 national journals and 97 international journals.

STATISTICS OF LIBRARY & INFORMATION SERVICES		
Particulars	**Details**	
No. of Titles (course-wise) in the College Library	Pharmaceutical Technology	1169
No. of Volumes (course-wise) in the College Library	Pharmaceutical Technology	9365
No. of National Journals (course-wise) in the College Library	Pharmaceutical Technology	16
No. of International Journals (course-wise) in the College Library	International Journals 97	
No. of E-Journals (course-wise) in the College Library	Total 97 (BENTHAM- 23, DELNET-68STM-6)	
Reading Room's seating capacity for the number of students	96	
Multimedia PCs for Digital Library / Internet Surfing capacity for the number of students in reading room	10 PCs	

c) **Details of E-journals renewal**

The Institute renewed subscription of E-journals and softwares STM, NISCAIR, BENTHAM, DELNET, LibSys

Name of the E-Journal/ Software	Renewal	Approx. Price (Rs)
STM	2014-15	22500
NISCAIR	2014-15	29900
BENTHAM	2014-15	75400
DELNET	2014-15	30,000
LibSys	2014-15	13715

GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY

(UNIT OF GURUNANAK EDUCATIONAL TRUST)

157/F, NILGUNJ ROAD, KOLKATA - 700 114

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31.03.2016

(UNDER PROCESS OF AUDIT)

INCOME	SCH NO	AMOUNT IN Rs. YEAR ENDED 31.03.2016
COLLEGE FEES	8(A)	49,949,000
HOSTEL ACCOUNT (NET)	9 (A)	1,063,618
OTHER INCOME	10 (A)	3,796,481
TOTAL INCOME	A	54,809,100
EXPENDITURE		
ADMINISTRATIVE EXPENSES	12 (A)	8,095,535
TEACHING / TRAINNING COST	11 (A)	22,817,033
DEPRECIATION	3	6,296,530
TOTAL EXPENDITURE	B	37,209,097
EXCESS OF INCOME OVER EXPENDITURE	A-B	17,600,002

GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY

(UNIT OF GURUNANAK EDUCATIONAL TRUST)

157/F, NILGUNJ ROAD, KOLKATA - 700 114

SCHEDULES ANNEXED TO FORMING PART OF INCOME & EXPENDITURE ACCOUNT

	Amount in Rs.	
	(As on 31.03.2016)	
SCHEDULE 8 (A)		
TUITION FEES		
Tuition Fees	37,249,000	
Admission Fees	905,000	
Library Fees	555,500	
Book Bank & Library Fees	500	
Professional Training & Project Fees	10,663,000	
Games & Sports	576,000	
		49,949,000
SCHEDULE 9 (A)		
HOSTEL ACCOUNT		
Hostel Fees	1,311,250	
Hostel Admission Fees	125,000	
		1,436,250
Hostel Mess Expenses	372,632	
		372,632
		1,063,618
SCHEDULE 10 (A)		
OTHER INCOME		
Fine	69,919	
Prospectus	164,500	
Uniform Charges	580,000	
Interest on Savings A/C	293,907	
Interest on Fixed Deposit	2,172,598	
Income form Seminer	2,640	
Center Fees	96,204	
Library Fine	14,307	
Income from Training	378,000	
Other Income	24,406	
		3,796,481
SCHEDULE 11 (A)		
TEACHING / TRAINING COSTS		
Salary, Bonus & Allowances	21,214,666	

Honorarium	881,943	
Staff Welfare Expenses	720,424	
		22,817,033
SCHEDULE 12 (A)		
ADMINISTRATIVE EXPENSES		
Advertisement Expenses		102,600
Bank Charges		8,953
Books & Periodicals		105,419
Business Devlopment Expenses		200,000
Fuel & Lubricants		1,000
Consummables		465,859
Examination Exp.		34,517
Gardening Exp.		89,550
General Expenses		74,926
Car Hire Charges		31,256
Inspection Expenses		556,790
Insurance Premium		15,074
Legal Charges		12,589
Membership Fees		220,000
Office Expenses		57,174
Outsourceing Exp.		743,650
Postage & Stamp		9,601
Printing & Stationary		349,006
Consultancy		2,500
Refreshment Exp.		128,158
Registration & Affiliation Expenses		1,133,500
Repair & Maintanance		1,339,814
Scholarship		1,389,780
Seminer & Conference	121,557	
Less: Grant-in-aid	30,000	91,557
Sports & Games		32,142
Student Welfare		258,478
Student kits		513,202
Telephone & Fax		25,472
Traning & Project Exp.		25,000
Travelling & Conveyance Exps.		77,968
R & D Activity	16,400	
Less: Grant-in-Aid	16,400	-
		8,095,535

ANNEXURE-1

UNIVERSITY RESULTS 2015-16

ODD SEMESTER

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(formerly known as West Bengal University of Technology)

RESULT 2015-2016

College Name : GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY

For the FIRST YEAR FIRST SEMESTER EXAMINATION OF 2015-2016

Degree : Bpharm Pharmacy

ROLL NO.	NAME	HU101	PT101	PT103	PT106	M103/PTB 101	PT191	PT193	PT196	PTB 191	SG PA
1860191 5001	ABHIJIT DAS	A (24)	A (24)	E (36)	E (27)	A (24)	E (18)	O (20)	O (20)	E (18)	8.79
1860191 5002	ABHINAV KUMAR JHA	A (24)	B (21)	A (32)	A (24)	F (6)	E (18)	E (18)	E (18)	A (16)	7.38
1860191 5003	ABHISHEK KUMAR SINGH	C (18)	C (18)	B (28)	A (24)	A (24)	E (18)	A (16)	E (18)	A (16)	7.50
1860191 5004	ABU SUFIAN.	B (21)	B (21)	B (28)	B (21)	D (15)	E (18)	B (14)	E (18)	A (16)	7.17
1860191 5005	ADRIJA JHA	A (24)	A (24)	E (36)	E (27)	E (27)	O (20)	O (20)	O (20)	E (18)	9.00
1860191 5006	ADRITA BOSE	B (21)	E (27)	A (32)	B (21)	E (27)	E (18)	O (20)	E (18)	E (18)	8.42
1860191 5007	AKASH KUMAR SAMANTA	F (6)	D (15)	B (28)	C (18)	F (6)	A (16)	A (16)	A (16)	B (14)	5.63

1860191 5008	ALISHA AGARWAL	A (24)	A (24)	E (36)	E (27)	E (27)	O (20)	O (20)	E (18)	E (18)	8.92
1860191 5009	ANANYA CHOWDHURY	A (24)	A (24)	A (32)	A (24)	A (24)	O (20)	O (20)	O (20)	O (20)	8.67
1860191 5010	ANIK MANDAL	A (24)	C (18)	B (28)	B (21)	D (15)	A (16)	E (18)	A (16)	A (16)	7.17
1860191 5011	ANIK MUKHERJEE	A (24)	B (21)	A (32)	A (24)	B (21)	E (18)	E (18)	E (18)	O (20)	8.17
1860191 5012	ANIKET DEY	F (6)	F (6)	F (8)	F (6)	F (6)	I (4)	I (4)	I (4)	I (4)	2.00
1860191 5013	ANIMESH PAUL	B (21)	D (15)	B (28)	C (18)	D (15)	A (16)	E (18)	A (16)	A (16)	6.79
1860191 5014	ANISH MUKHERJEE	A (24)	B (21)	A (32)	E (27)	C (18)	E (18)	E (18)	E (18)	E (18)	8.08
1860191 5015	ANWESHA CHAKRABORTY	B (21)	C (18)	B (28)	C (18)	F (6)	E (18)	A (16)	O (20)	E (18)	6.79
1860191 5016	ARANYA PATRA	C (18)	C (18)	C (24)	B (21)	D (15)	E (18)	A (16)	A (16)	A (16)	6.75
1860191 5017	ARITRA MUKHERJEE	C (18)	F (6)	F (8)	D (15)	F (6)	C (12)	B (14)	A (16)	B (14)	4.54
1860191 5018	ARKA CHOWDHURY	A (24)	B (21)	C (24)	A (24)	C (18)	A (16)	E (18)	E (18)	A (16)	7.46
1860191 5019	ARKAJYOTI SEN	A (24)	B (21)	A (32)	A (24)	E (27)	E (18)	E (18)	E (18)	E (18)	8.33
1860191 5020	ARNAB GHOSH	A (24)	C (18)	C (24)	A (24)	F (6)	E (18)	E (18)	E (18)	E (18)	7.00
1860191 5021	ARNAB SAHA	A (24)	C (18)	C (24)	E (27)	A (24)	A (16)	E (18)	E (18)	A (16)	7.71
1860191 5022	ARPAN CHATTERJEE	B (21)	C (18)	C (24)	B (21)	F (6)	A (16)	A (16)	A (16)	B (14)	6.33
1860191 5023	ARUN GUPTA	A (24)	B (21)	B (28)	E (27)	B (21)	A (16)	E (18)	O (20)	E (18)	8.04

18601915024	AUNKITA BISWAS	B (21)	C (18)	D (20)	B (21)	D (15)	A (16)	A (16)	E (18)	A (16)	6.71
18601915025	AYAN GOSWAMI	C (18)	D (15)	F (8)	F (6)	F (6)	B (14)	B (14)	B (14)	B (14)	4.54
18601915026	BEDABRATA RAY	A (24)	B (21)	A (32)	A (24)	A (24)	E (18)	E (18)	O (20)	E (18)	8.29
18601915027	BIDARVA DAS	B (21)	C (18)	C (24)	C (18)	F (6)	A (16)	E (18)	A (16)	A (16)	6.38
18601915028	BIKASH GAYEN	B (21)	D (15)	D (20)	C (18)	C (18)	A (16)	B (14)	A (16)	A (16)	6.42
18601915029	BINDU KUNDU	B (21)	D (15)	C (24)	C (18)	F (6)	A (16)	A (16)	A (16)	A (16)	6.17
18601915030	BIPASHA MUKHERJEE	B (21)	D (15)	D (20)	D (15)	B (21)	A (16)	A (16)	B (14)	B (14)	6.33
18601915031	BIPLAB DEY	B (21)	C (18)	C (24)	C (18)	D (15)	A (16)	B (14)	B (14)	A (16)	6.50
18601915032	BISHWAJEET BERA	E (27)	A (24)	B (28)	A (24)	B (21)	E (18)	A (16)	A (16)	E (18)	8.00
18601915033	BISWADIP NAG	A (24)	D (15)	C (24)	C (18)	D (15)	E (18)	A (16)	A (16)	E (18)	6.83
18601915034	CHANDRAMA MALLICK	B (21)	B (21)	A (32)	B (21)	E (27)	E (18)	A (16)	B (14)	A (16)	7.75
18601915035	CHAYAN DAS	D (15)	F (6)	F (8)	D (15)	F (6)	A (16)	C (12)	B (14)	C (12)	4.33
18601915036	DEBANGANA BHATTACHARYYA	A (24)	B (21)	B (28)	B (21)	A (24)	O (20)	E (18)	E (18)	E (18)	8.00
18601915037	DEBJIT GHOSH	C (18)	F (6)	D (20)	D (15)	F (6)	A (16)	B (14)	B (14)	B (14)	5.13
18601915038	DIPANWITA CHOWDHURY	A (24)	C (18)	C (24)	B (21)	F (6)	E (18)	A (16)	E (18)	O (20)	6.88
18601915039	DIPJYOTI GHOSH	B (21)	D (15)	C (24)	C (18)	F (6)	I (4)	I (4)	C (12)	C (12)	4.83

1860191 5040	DIPPYOMAN GUHA	B (21)	B (21)	A (32)	B (21)	F (6)	E (18)	B (14)	E (18)	E (18)	7.04
1860191 5041	EMAMUL MOULA	B (21)	C (18)	B (28)	C (18)	B (21)	E (18)	A (16)	A (16)	E (18)	7.25
1860191 5042	EMON CHANDA	C (18)	F (6)	C (24)	D (15)	F (6)	C (12)	B (14)	B (14)	B (14)	5.13
1860191 5043	GOBINDO DAS KUNDU	B (21)	D (15)	C (24)	B (21)	F (6)	E (18)	A (16)	A (16)	B (14)	6.29
1860191 5044	GOURAB BANIK	B (21)	D (15)	B (28)	C (18)	C (18)	E (18)	E (18)	E (18)	B (14)	7.00
1860191 5045	HIMON BISWAS	B (21)	D (15)	B (28)	D (15)	F (6)	E (18)	A (16)	A (16)	B (14)	6.21
1860191 5046	IMON GHOSH	B (21)	D (15)	C (24)	C (18)	D (15)	E (18)	A (16)	O (20)	A (16)	6.79
1860191 5047	INDRANIL DE	A (24)	B (21)	A (32)	C (18)	F (6)	E (18)	E (18)	E (18)	E (18)	7.21
1860191 5048	IPSITA BHATTACHA RJEE	A (24)	C (18)	A (32)	E (27)	E (27)	E (18)	E (18)	O (20)	E (18)	8.42
1860191 5049	ISHITA SEN	A (24)	B (21)	B (28)	E (27)	A (24)	O (20)	A (16)	O (20)	E (18)	8.25
1860191 5050	IVY SAHA	A (24)	B (21)	B (28)	E (27)	E (27)	E (18)	A (16)	O (20)	A (16)	8.21
1860191 5051	KAUSTAV DAS	B (21)	C (18)	B (28)	C (18)	B (21)	E (18)	A (16)	E (18)	A (16)	7.25
1860191 5052	KAUSTAV HALDAR	A (24)	C (18)	C (24)	D (15)	B (21)	A (16)	A (16)	E (18)	A (16)	7.00
1860191 5053	KOYAL GHOSH	A (24)	C (18)	B (28)	B (21)	F (6)	E (18)	A (16)	E (18)	E (18)	6.96
1860191 5054	KUSAL MUKHERJEE	C (18)	D (15)	D (20)	C (18)	D (15)	B (14)	A (16)	A (16)	A (16)	6.17
1860191 5055	M VENKTESH	B (21)	D (15)	C (24)	B (21)	B (21)	E (18)	A (16)	A (16)	A (16)	7.00
1860191 5056	MANISHA JHA	B (21)	A (24)	A (32)	A (24)	E (27)	E (18)	E (18)	E (18)	O (20)	8.42

1860191 5057	MANODIPA GHOSH	E (27)	C (18)	B (28)	C (18)	F (6)	E (18)	O (20)	O (20)	O (20)	7.29
1860191 5058	MARUF BILLA AKUNJEE	B (21)	D (15)	B (28)	B (21)	D (15)	E (18)	A (16)	A (16)	B (14)	6.83
1860191 5059	MD MOJAFFAR MOLLA	B (21)	D (15)	C (24)	D (15)	D (15)	E (18)	B (14)	A (16)	B (14)	6.33
1860191 5060	MIR SAMIM ALI	B (21)	C (18)	A (32)	B (21)	B (21)	E (18)	A (16)	E (18)	A (16)	7.54
1860191 5061	MOHOJIT CHAKRABOR TY	B (21)	D (15)	C (24)	D (15)	F (6)	A (16)	A (16)	E (18)	A (16)	6.13
1860191 5062	MRINMAY DAS	B (21)	C (18)	C (24)	C (18)	C (18)	A (16)	A (16)	E (18)	A (16)	6.88
1860191 5063	NEPAL HAZRA	A (24)	D (15)	C (24)	D (15)	F (6)	E (18)	A (16)	A (16)	A (16)	6.25
1860191 5064	NIYATI JAIN	B (21)	B (21)	B (28)	A (24)	B (21)	E (18)	E (18)	E (18)	A (16)	7.71
1860191 5065	PALASH SAHU	B (21)	F (6)	D (20)	D (15)	D (15)	E (18)	A (16)	A (16)	A (16)	5.96
1860191 5066	PARMITA ROY	D (15)	D (15)	D (20)	D (15)	F (6)	E (18)	B (14)	A (16)	B (14)	5.54
1860191 5067	PAROMITA SENGUPTA	A (24)	C (18)	B (28)	B (21)	F (6)	E (18)	A (16)	E (18)	E (18)	6.96
1860191 5068	PARTHIBA GHOSH	A (24)	C (18)	B (28)	B (21)	A (24)	E (18)	E (18)	E (18)	E (18)	7.79
1860191 5069	PIJUSH KANTI BANGAL	C (18)	D (15)	C (24)	C (18)	F (6)	A (16)	A (16)	A (16)	B (14)	5.96
1860191 5070	PRATYAY CHATTERJEE	C (18)	F (6)	D (20)	C (18)	D (15)	A (16)	A (16)	A (16)	B (14)	5.79
1860191 5071	PRITHA JANAH	C (18)	C (18)	B (28)	A (24)	A (24)	O (20)	E (18)	A (16)	E (18)	7.67
1860191 5072	PRIYANJALI BISWAS	C (18)	D (15)	C (24)	C (18)	C (18)	E (18)	O (20)	A (16)	A (16)	6.79

18601915073	PRIYANKA NATH	B (21)	D (15)	D (20)	C (18)	F (6)	E (18)	A (16)	E (18)	E (18)	6.25
18601915074	PRIYANKA ROY	B (21)	F (6)	B (28)	C (18)	F (6)	E (18)	A (16)	A (16)	A (16)	6.04
18601915075	RANIT KANJILAL	B (21)	C (18)	C (24)	A (24)	E (27)	E (18)	E (18)	E (18)	A (16)	7.67
18601915076	RAYASHA DAS	B (21)	B (21)	C (24)	B (21)	F (6)	O (20)	E (18)	E (18)	O (20)	7.04
18601915077	REHENA SULTANA	B (21)	C (18)	C (24)	C (18)	F (6)	A (16)	A (16)	E (18)	A (16)	6.38
18601915078	RISHAV NAG	C (18)	A (24)	A (32)	A (24)	F (6)	E (18)	E (18)	O (20)	E (18)	7.42
18601915079	RITAM BASAK	B (21)	D (15)	C (24)	C (18)	C (18)	E (18)	A (16)	A (16)	A (16)	6.75
18601915080	RITIK MISHRA	F (6)	F (6)	F (8)	F (6)	F (6)	C (12)	C (12)	B (14)	C (12)	3.42
18601915081	ROUNAK RAM	D (15)	D (15)	D (20)	D (15)	F (6)	A (16)	B (14)	A (16)	A (16)	5.54
18601915082	RUPAM DAS	F (6)	F (6)	F (8)	D (15)	F (6)	A (16)	B (14)	A (16)	B (14)	4.21
18601915083	RUPANTAR SAMANTA	C (18)	F (6)	D (20)	C (18)	F (6)	A (16)	B (14)	A (16)	E (18)	5.50
18601915084	SAGAR MAITI	A (24)	B (21)	A (32)	A (24)	A (24)	O (20)	O (20)	O (20)	O (20)	8.54
18601915085	SAIKAT SAMANTA	D (15)	F (6)	D (20)	D (15)	F (6)	C (12)	B (14)	B (14)	B (14)	4.83
18601915086	SAJAL KAR	D (15)	F (6)	F (8)	D (15)	F (6)	A (16)	B (14)	B (14)	A (16)	4.58
18601915087	SAMBRITA CHATTERJEE	B (21)	B (21)	B (28)	E (27)	D (15)	E (18)	E (18)	O (20)	E (18)	7.75
18601915088	SANCHITA ADHIKARY	B (21)	B (21)	B (28)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	7.79
18601915089	SANJIB CHAKRABORTY	D (15)	D (15)	B (28)	B (21)	C (18)	E (18)	A (16)	A (16)	A (16)	6.79

18601915090	SATYABRATA KUNDU	B (21)	C (18)	A (32)	B (21)	C (18)	E (18)	E (18)	E (18)	E (18)	7.58
18601915091	SATYAM PUTATUNDA	B (21)	D (15)	C (24)	F (6)	F (6)	C (12)	A (16)	A (16)	C (12)	5.33
18601915092	SAYAK NANDY	B (21)	C (18)	B (28)	C (18)	D (15)	E (18)	A (16)	A (16)	E (18)	7.00
18601915093	SAYAN SARKAR	C (18)	F (6)	D (20)	D (15)	C (18)	A (16)	B (14)	A (16)	A (16)	5.79
18601915094	SAYANI BHAUMIK	B (21)	D (15)	D (20)	C (18)	F (6)	E (18)	B (14)	E (18)	A (16)	6.08
18601915095	SELIM AHAMMED SELIM	C (18)	D (15)	D (20)	F (6)	D (15)	A (16)	B (14)	A (16)	A (16)	5.67
18601915096	SEMANTI PAUL	B (21)	A (24)	B (28)	A (24)	E (27)	E (18)	E (18)	O (20)	E (18)	8.25
18601915097	SHABAZ KHAN	C (18)	D (15)	C (24)	B (21)	F (6)	A (16)	B (14)	E (18)	E (18)	6.25
18601915098	SHAYAAN ALAM	C (18)	D (15)	C (24)	B (21)	B (21)	A (16)	B (14)	A (16)	A (16)	6.71
18601915099	SHEERSHO NEOGI	B (21)	D (15)	D (20)	B (21)	F (6)	C (12)	B (14)	B (14)	B (14)	5.71
18601915100	SHOVON GHOSH	C (18)	D (15)	D (20)	B (21)	F (6)	E (18)	B (14)	O (20)	A (16)	6.17
18601915101	SHREE JISHNU PATRA	D (15)	D (15)	D (20)	D (15)	F (6)	A (16)	B (14)	B (14)	C (12)	5.29
18601915102	SIRSHASIS DEB	A (24)	C (18)	C (24)	B (21)	B (21)	A (16)	A (16)	B (14)	E (18)	7.17
18601915103	SK TAUSIF UDDIN	B (21)	F (6)	F (8)	C (18)	F (6)	E (18)	A (16)	B (14)	A (16)	5.13
18601915104	SNEHA SARKAR	A (24)	B (21)	B (28)	A (24)	A (24)	O (20)	E (18)	O (20)	O (20)	8.29
18601915105	SOHAM RAY	A (24)	B (21)	B (28)	A (24)	D (15)	E (18)	E (18)	E (18)	E (18)	7.67
1860191	SOUBHIK	B	D	C	B	F (6)	B	A	E	B	6.21

5106	SAHA	(21)	(15)	(24)	(21)		(14)	(16)	(18)	(14)	
18601915107	SOUMAJIT BAG	B (21)	D (15)	C (24)	B (21)	F (6)	E (18)	A (16)	A (16)	A (16)	6.38
18601915108	SOUNAK PAUL	B (21)	C (18)	C (24)	A (24)	B (21)	A (16)	E (18)	E (18)	A (16)	7.33
18601915109	SOUNOK SENGUPTA	C (18)	D (15)	C (24)	C (18)	F (6)	A (16)	B (14)	A (16)	B (14)	5.88
18601915110	SOURAV NAYAK	C (18)	D (15)	C (24)	D (15)	D (15)	A (16)	A (16)	A (16)	B (14)	6.21
18601915111	SOURIK MONDAL	C (18)	F (6)	D (20)	D (15)	F (6)	A (16)	C (12)	B (14)	B (14)	5.04
18601915112	SOUVIK KUMAR SARKAR	A (24)	D (15)	C (24)	C (18)	F (6)	E (18)	E (18)	E (18)	E (18)	6.63
18601915113	SREEPAYON CHATTERJEE	C (18)	D (15)	D (20)	D (15)	F (6)	C (12)	A (16)	C (12)	C (12)	5.25
18601915114	SRIJITA SEN	A (24)	A (24)	A (32)	E (27)	A (24)	E (18)	O (20)	O (20)	E (18)	8.63
18601915115	SUBHA SAHA	C (18)	D (15)	C (24)	C (18)	F (6)	A (16)	B (14)	A (16)	A (16)	5.96
18601915116	SUBHADEEP GHOSH	C (18)	D (15)	C (24)	B (21)	C (18)	E (18)	A (16)	A (16)	A (16)	6.75
18601915117	SUMAN DUTTA	B (21)	C (18)	C (24)	B (21)	F (6)	E (18)	E (18)	E (18)	A (16)	6.67
18601915118	SUNAYAN PAL	B (21)	D (15)	C (24)	C (18)	F (6)	E (18)	A (16)	E (18)	A (16)	6.33
18601915119	SUSHMITA GHOSH	A (24)	B (21)	B (28)	A (24)	D (15)	O (20)	A (16)	E (18)	E (18)	7.67
18601915120	SUSHMITA GUHA	B (21)	B (21)	E (36)	A (24)	A (24)	O (20)	O (20)	O (20)	E (18)	8.50
18601915121	TABREZ KHAN	C (18)	D (15)	C (24)	D (15)	F (6)	C (12)	C (12)	C (12)	C (12)	5.25

Degree : Bpharm Pharmacy

ROLL NO.	NAME	HU1 01	PT1 01	PT1 03	PT1 06	M103 /PTB 101	PT1 91	PT1 93	PT1 96	PTB1 91	SG PA
0918601 9051	KOUSTUVA PRAMANIK	D (15)	C (18)	D (15)	D (20)	C (18)	B (14)	B (14)	B (14)	B (14)	5.92
0918601 9059	MOUSAM GHOSH	D (15)	D (15)	D (15)	D (20)	D (15)	B (14)	B (14)	B (14)	C (12)	5.58
1860191 2011	ARIJIT MONDAL	B (21)	D (15)	D (20)	D (15)	F (6)	A (16)	B (14)	A (16)	A (16)	5.79
1860191 2022	ATRI PAIN MAZUMDER	C (18)	D (15)	B (28)	B (21)	D (15)	A (16)	B (14)	A (16)	A (16)	6.63
1860191 2027	BRATIN DAS	D (15)	F (6)	D (20)	D (15)	D (15)	A (16)	B (14)	A (16)	A (16)	5.54
1860191 2030	DEBANJAN MITRA	D (15)	C (18)	D (20)	D (15)	D (15)	A (16)	B (14)	B (14)	C (12)	5.79
1860191 2066	RAJDEEP BANERJEE	D (15)	D (15)	C (24)	C (18)	D (15)	A (16)	A (16)	A (16)	A (16)	6.29
1860191 2093	SOUMYA BANERJEE	D (15)	D (15)	D (20)	C (18)	F (6)	A (16)	B (14)	A (16)	A (16)	5.67
1860191 2107	SUBHAM MONDAL	D (15)	F (6)	D (20)	D (15)	D (15)	B (14)	B (14)	B (14)	B (14)	5.29
1860191 3021	ARITRA GHOSH	C (18)	C (18)	B (28)	C (18)	F (6)	E (18)	B (14)	A (16)	B (14)	6.25
1860191 3063	RITAM BAIRAGI	A (24)	D (15)	C (24)	A (24)	F (6)	E (18)	C (12)	B (14)	B (14)	6.29
1860191 3074	SAYANTAN DATTA	A (24)	C (18)	B (28)	A (24)	F (6)	E (18)	C (12)	A (16)	B (14)	6.67
1860191 3081	SOHAM BHATTACH ARYA	B (21)	D (15)	C (24)	D (15)	F (6)	A (16)	C (12)	B (14)	B (14)	5.71
1860191 3090	SUBHADIP CHAKRABO RTY	A (24)	D (15)	C (24)	B (21)	D (15)	E (18)	C (12)	A (16)	E (18)	6.79
1860191 3097	TANAYA PALIT	C (18)	F (6)	D (20)	C (18)	D (15)	E (18)	B (14)	B (14)	A (16)	5.79

1860191 4001	ABDUR RAHAMAN	C (18)	C (18)	C (24)	D (15)	D (15)	B (14)	B (14)	A (16)	B (14)	6.17
1860191 4004	ADITYADEB GHOSH	E (27)	A (24)	A (32)	B (21)	F (6)	A (16)	B (14)	E (18)	A (16)	7.25
1860191 4005	ALONGKRIT DEY	C (18)	C (18)	D (20)	D (15)	F (6)	C (12)	B (14)	A (16)	B (14)	5.54
1860191 4013	APRATIM PAL	B (21)	A (24)	A (32)	C (18)	D (15)	C (12)	A (16)	A (16)	A (16)	7.08
1860191 4020	BISWAJIT CHOWDHU RY	B (21)	D (15)	D (20)	D (15)	D (15)	B (14)	B (14)	A (16)	C (12)	5.92
1860191 4034	KARTICK KOLEY	B (21)	B (21)	D (20)	D (15)	D (15)	A (16)	B (14)	B (14)	B (14)	6.25
1860191 4037	MADHURIM A SAMANTA	B (21)	B (21)	B (28)	C (18)	D (15)	E (18)	A (16)	E (18)	B (14)	7.04
1860191 4040	MANOJIT DUTTA	D (15)	D (15)	C (24)	D (15)	F (6)	C (12)	B (14)	A (16)	B (14)	5.46
1860191 4046	NILADRI SEKHAR MONDAL	C (18)	C (18)	C (24)	F (6)	F (6)	C (12)	B (14)	B (14)	B (14)	5.25
1860191 4047	NILANJANA GHOSH	C (18)	E (27)	B (28)	B (21)	F (6)	A (16)	E (18)	E (18)	A (16)	7.00
1860191 4052	PRIYANKA KUMARI	D (15)	B (21)	C (24)	B (21)	C (18)	E (18)	E (18)	E (18)	A (16)	7.04
1860191 4059	SABNAM PARVEEN	D (15)	E (27)	C (24)	D (15)	F (6)	E (18)	A (16)	E (18)	A (16)	6.46
1860191 4061	SASWATA MUKHERJE E	C (18)	B (21)	C (24)	C (18)	D (15)	A (16)	A (16)	A (16)	B (14)	6.58
1860191 4062	SAYAN CHATTERJE E	B (21)	B (21)	B (28)	D (15)	D (15)	B (14)	A (16)	A (16)	B (14)	6.67
1860191 4073	SRIJAN JOARDAR	B (21)	D (15)	C (24)	D (15)	F (6)	A (16)	A (16)	A (16)	C (12)	5.88
1860191	SUBHAJIT	A	D	A	C	F (6)	B	A	B	B	6.38

4077	KARAK	(24)	(15)	(32)	(18)		(14)	(16)	(14)	(14)	
1860191 4080	SUMEL ASHIQUE	E (27)	B (21)	B (28)	A (24)	I (6)	O (20)	E (18)	E (18)	B (14)	7.33
1860191 4086	SUTIRTHA DAS	A (24)	C (18)	D (20)	B (21)	F (6)	E (18)	E (18)	E (18)	B (14)	6.54
1860191 4087	SUVAJIT SANTRA	A (24)	D (15)	D (20)	B (21)	F (6)	A (16)	A (16)	A (16)	B (14)	6.17
1860191 4089	SWAGATA PAL	E (27)	A (24)	C (24)	A (24)	D (15)	A (16)	A (16)	E (18)	A (16)	7.50
1860191 4090	SWARAJIT BARIK	C (18)	F (6)	C (24)	I (6)	F (6)	B (14)	B (14)	A (16)	C (12)	4.83
1860191 4094	TANMOY KUMAR SAHA	A (24)	C (18)	C (24)	C (18)	F (6)	E (18)	E (18)	E (18)	A (16)	6.67
1860191 4096	TANUSHRE E CHATTERJE E	C (18)	D (15)	D (20)	D (15)	F (6)	A (16)	E (18)	A (16)	B (14)	5.75
1860191 4099	TUHIN GHOSH	D (15)	D (15)	D (20)	C (18)	D (15)	B (14)	A (16)	A (16)	B (14)	5.96

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(formerly known as West Bengal University of Technology)

RESULT 2015-2016

College Name : GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY

For the SECOND YEAR FIRST SEMESTER EXAMINATION OF 2015-2016

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT 301	PT 304	PT 305	PT 306	PT 307	CS 303	PT 391	PT 394	PT 396	PT 397	CS 393	SG PA
186019 12107	SUBHAM MONDAL	D (20)	F (8)	D (15)	C (24)	D (20)	C (24)	C (12)	A (16)	A (16)	A (16)	A (16)	5.67
186019 14001	ABDUR RAHAMAN	D (20)	F (8)	C (18)	C (24)	C (24)	D (20)	B (14)	A (16)	B (14)	B (14)	A (16)	5.70
186019 14002	ABHISHEK SINGH	C (24)	B (28)	B (21)	A (32)	D (20)	C (24)	E (18)	E (18)	E (18)	E (18)	A (16)	7.18
186019 14004	ADITYADEB GHOSH	C (24)	F (8)	B (21)	B (28)	B (28)	D (20)	E (18)	E (18)	E (18)	O (20)	E (18)	6.70
186019 14005	ALONGKRIT DEY	F (8)	F (8)	F (6)	C (24)	D (20)	F (8)	I (4)	I (4)	I (4)	I (4)	I (4)	2.85
186019 14006	ALVEE BEGUM	B (28)	C (24)	B (21)	A (32)	A (32)	D (20)	A (16)	E (18)	E (18)	E (18)	E (18)	7.42
186019 14007	AMIT KUMAR	A (32)	B (28)	A (24)	E (36)	A (32)	D (20)	E (18)	E (18)	E (18)	A (16)	A (16)	7.82
186019 14008	ANINDYA SUNDAR	B (28)	B (28)	C (18)	A (32)	B (28)	D (20)	O (20)	E (18)	E (18)	A (16)	E (18)	7.39

	DAS											
186019 14009	ANKAN RAY	C (24)	D (20)	C (18)	B (28)	C (24)	C (24)	E (18)	A (16)	E (18)	A (16)	A (16)	6.73
186019 14010	ANKIT CHOWDHURY	A (32)	A (32)	E (27)	E (36)	E (36)	C (24)	E (18)	E (18)	E (18)	E (18)	E (18)	8.39
186019 14011	ANKUR SEN	A (32)	B (28)	A (24)	E (36)	E (36)	C (24)	E (18)	O (20)	E (18)	E (18)	O (20)	8.30
186019 14012	ANURITA SARKAR	B (28)	C (24)	A (24)	A (32)	A (32)	C (24)	E (18)	E (18)	E (18)	E (18)	A (16)	7.64
186019 14013	APRATIM PAL	C (24)	D (20)	B (21)	A (32)	A (32)	D (20)	A (16)	A (16)	A (16)	A (16)	A (16)	6.94
186019 14014	ARNAB CHAKRABARTI	D (20)	D (20)	C (18)	B (28)	C (24)	D (20)	E (18)	E (18)	E (18)	E (18)	E (18)	6.67
186019 14015	ARNAB MONDAL	B (28)	C (24)	B (21)	A (32)	B (28)	B (28)	E (18)	E (18)	E (18)	E (18)	O (20)	7.67
186019 14016	ARNAB SARKAR	B (28)	B (28)	A (24)	A (32)	E (36)	C (24)	E (18)	E (18)	E (18)	E (18)	O (20)	8.00
186019 14017	ASIF IQBAL	B (28)	A (32)	B (21)	A (32)	B (28)	D (20)	A (16)	A (16)	A (16)	B (14)	A (16)	7.24
186019 14018	AVINANDA DEY	E (36)	O (40)	E (27)	E (36)	E (36)	E (36)	O (20)	O (20)	O (20)	A (16)	E (18)	9.24
186019 14019	AVISHEK GUCHAIT	C (24)	B (28)	B (21)	A (32)	B (28)	C (24)	E (18)	A (16)	E (18)	B (14)	E (18)	7.30
186019 14020	BISWAJIT CHOWDHURY	D (20)	C (24)	C (18)	C (24)	B (28)	D (20)	A (16)	E (18)	A (16)	B (14)	E (18)	6.55
186019 14021	BUSHRA SHABNAM	B (28)	A (32)	B (21)	E (36)	A (32)	B (28)	E (18)	E (18)	A (16)	B (14)	A (16)	7.85
186019 14022	DEBANGSU NANDY	D (20)	C (24)	B (21)	B (28)	A (32)	D (20)	A (16)	A (16)	A (16)	E (18)	C (12)	6.76
186019 14023	DEBARGHA DATTA	E (36)	E (36)	E (27)	E (36)	E (36)	C (24)	E (18)	O (20)	E (18)	E (18)	O (20)	8.76
186019	DEBOSMIT	A	A	A	E	A	B	E	E	E	A	E	8.2

Roll	Name	1	2	3	4	5	6	7	8	9	10	11	GPA
14024	A DATTA	(32)	(32)	(24)	(36)	(32)	(28)	(18)	(18)	(18)	(16)	(18)	4
186019 14025	DEEP ROHAN CHATTERJEE	E (36)	A (32)	A (24)	A (32)	A (32)	B (28)	O (20)	E (18)	E (18)	E (18)	O (20)	8.42
186019 14026	DIPAN CHATTERJEE	B (28)	A (32)	C (18)	B (28)	D (20)	D (20)	A (16)	E (18)	A (16)	B (14)	E (18)	6.91
186019 14027	GOURAV SAMAJDAR	A (32)	C (24)	B (21)	A (32)	B (28)	B (28)	E (18)	E (18)	E (18)	B (14)	A (16)	7.55
186019 14028	HIMADRI PODDAR	A (32)	B (28)	B (21)	A (32)	B (28)	B (28)	E (18)	E (18)	E (18)	B (14)	A (16)	7.67
186019 14029	IMRUL KAYES	D (20)	C (24)	B (21)	C (24)	D (20)	F (8)	B (14)	A (16)	B (14)	C (12)	C (12)	5.61
186019 14030	INDRAJIT THAKUR	E (36)	O (40)	E (27)	E (36)	E (36)	B (28)	O (20)	O (20)	E (18)	A (16)	O (20)	9.00
186019 14031	ISANI DUTTA	B (28)	A (32)	A (24)	A (32)	E (36)	C (24)	E (18)	E (18)	E (18)	A (16)	E (18)	8.00
186019 14032	JAGGUMANTRI SHRAVANTHI	A (32)	E (36)	E (27)	E (36)	E (36)	B (28)	E (18)	E (18)	E (18)	E (18)	E (18)	8.64
186019 14033	JAYITA ROY	A (32)	A (32)	A (24)	A (32)	A (32)	C (24)	A (16)	E (18)	A (16)	A (16)	A (16)	7.82
186019 14034	KARTICK KOLEY	F (8)	D (20)	C (18)	D (20)	F (8)	F (8)	B (14)	A (16)	B (14)	B (14)	B (14)	4.67
186019 14035	KAUSTAV BHATTACHARYA	D (20)	D (20)	D (15)	C (24)	C (24)	D (20)	A (16)	A (16)	B (14)	B (14)	A (16)	6.03
186019 14036	KAUSTAV PAL	A (32)	E (36)	A (24)	E (36)	A (32)	C (24)	E (18)	E (18)	E (18)	E (18)	E (18)	8.30
186019 14037	MADHURIMA SAMANTA	B (28)	B (28)	C (18)	B (28)	B (28)	D (20)	E (18)	E (18)	E (18)	A (16)	A (16)	7.15
186019 14038	MAHULI MANNA	C (24)	C (24)	B (21)	A (32)	A (32)	C (24)	A (16)	B (14)	C (12)	B (14)	B (14)	6.88

186019 14039	MANAJIT NAHA	D (20)	D (20)	B (21)	B (28)	D (20)	F (8)	A (16)	E (18)	A (16)	A (16)	A (16)	6.03
186019 14040	MANOJIT DUTTA	D (20)	F (8)	F (6)	F (8)	F (8)	F (8)	A (16)	A (16)	C (12)	B (14)	A (16)	4.00
186019 14041	MAUTAN ROY	A (32)	B (28)	A (24)	A (32)	B (28)	C (24)	E (18)	E (18)	E (18)	E (18)	E (18)	7.82
186019 14042	MOHONA BHATTACH ARJEE	E (36)	B (28)	A (24)	A (32)	B (28)	B (28)	A (16)	E (18)	E (18)	A (16)	E (18)	7.94
186019 14043	MUDASSA R MANNAN	B (28)	C (24)	B (21)	A (32)	C (24)	D (20)	A (16)	A (16)	A (16)	A (16)	E (18)	7.00
186019 14044	NASRIN KHATUN	E (36)	B (28)	B (21)	E (36)	A (32)	B (28)	E (18)	E (18)	A (16)	A (16)	E (18)	8.09
186019 14045	NEHA DAS	A (32)	A (32)	E (27)	O (40)	B (28)	B (28)	O (20)	O (20)	O (20)	E (18)	O (20)	8.64
186019 14046	NILADRI SEKHAR MONDAL	D (20)	D (20)	F (6)	C (24)	F (8)	F (8)	A (16)	B (14)	B (14)	B (14)	A (16)	4.85
186019 14047	NILANJAN A GHOSH	B (28)	C (24)	A (24)	A (32)	D (20)	D (20)	E (18)	E (18)	O (20)	E (18)	E (18)	7.27
186019 14048	NIRMITA GUPTA	C (24)	D (20)	B (21)	B (28)	F (8)	F (8)	A (16)	E (18)	A (16)	E (18)	A (16)	5.85
186019 14049	NIRUPAN GUPTA	D (20)	F (8)	F (6)	D (20)	F (8)	D (20)	A (16)	A (16)	A (16)	A (16)	A (16)	4.91
186019 14050	NISHA KOLEY	E (36)	A (32)	E (27)	E (36)	B (28)	D (20)	E (18)	E (18)	E (18)	E (18)	E (18)	8.15
186019 14051	POULAMI DAS	A (32)	A (32)	A (24)	A (32)	C (24)	D (20)	O (20)	O (20)	O (20)	E (18)	E (18)	7.88
186019 14052	PRIYANKA KUMARI	D (20)	C (24)	B (21)	E (36)	C (24)	C (24)	A (16)	A (16)	E (18)	A (16)	E (18)	7.06
186019 14053	RASHMITA BISWAS	E (36)	B (28)	E (27)	E (36)	B (28)	B (28)	E (18)	E (18)	E (18)	A (16)	E (18)	8.21
186019 14054	RITUSHRE E BAG	C (24)	B (28)	A (24)	A (32)	D (20)	F (8)	A (16)	E (18)	E (18)	A (16)	A (16)	6.67
186019	RIYA	B	A	E	E	D	C	A	E	E	B	E	7.6

14055	SABNAM	(28)	(32)	(27)	(36)	(20)	(24)	(16)	(18)	(18)	(14)	(18)	1
186019 14056	ROHAN SAMANTA	B (28)	C (24)	A (24)	E (36)	F (8)	F (8)	A (16)	E (18)	A (16)	B (14)	E (18)	6.36
186019 14057	ROSHNI BHATTACHARYA	C (24)	C (24)	C (18)	B (28)	D (20)	C (24)	A (16)	E (18)	B (14)	B (14)	E (18)	6.61
186019 14058	ROUNAK DAS	A (32)	B (28)	B (21)	A (32)	E (36)	C (24)	E (18)	E (18)	A (16)	E (18)	O (20)	7.97
186019 14059	SABNAM PARVEEN	C (24)	D (20)	F (6)	C (24)	F (8)	F (8)	A (16)	E (18)	A (16)	E (18)	E (18)	5.33
186019 14060	SANKHA DASGUPTA	A (32)	B (28)	B (21)	A (32)	C (24)	D (20)	A (16)	A (16)	A (16)	C (12)	A (16)	7.06
186019 14061	SASWATA MUKHERJEE	C (24)	F (8)	B (21)	A (32)	D (20)	D (20)	A (16)	E (18)	A (16)	B (14)	A (16)	6.21
186019 14062	SAYAN CHATTERJEE	B (28)	C (24)	B (21)	A (32)	B (28)	D (20)	A (16)	E (18)	A (16)	E (18)	E (18)	7.24
186019 14063	SAYANTAN DAS	C (24)	C (24)	B (21)	A (32)	C (24)	F (8)	A (16)	E (18)	A (16)	E (18)	A (16)	6.58
186019 14064	SHOUVIK KUMAR DEBNATH	B (28)	B (28)	B (21)	A (32)	C (24)	C (24)	A (16)	E (18)	A (16)	E (18)	E (18)	7.36
186019 14065	SHREYA BANERJEE	B (28)	C (24)	E (27)	E (36)	C (24)	D (20)	A (16)	E (18)	A (16)	E (18)	A (16)	7.36
186019 14066	SK. MD. HARUN	D (20)	C (24)	A (24)	A (32)	D (20)	D (20)	E (18)	E (18)	A (16)	A (16)	E (18)	6.85
186019 14067	SNEHA BAG	A (32)	A (32)	A (24)	E (36)	C (24)	C (24)	O (20)	E (18)	E (18)	E (18)	E (18)	8.00
186019 14068	SOMNATH DIAN	C (24)	D (20)	A (24)	E (36)	C (24)	C (24)	A (16)	A (16)	A (16)	A (16)	E (18)	7.09
186019 14069	SOUMYASIS GUPTA	A (32)	E (36)	E (27)	E (36)	B (28)	A (32)	E (18)	E (18)	E (18)	O (20)	O (20)	8.64
186019 14070	SOURAV MAITY	F (8)	C (24)	B (21)	A (32)	F (8)	F (8)	A (16)	A (16)	A (16)	B (14)	E (18)	5.48

186019 14071	SOUVEEK TANTRI	D (20)	B (28)	A (24)	E (36)	C (24)	C (24)	E (18)	E (18)	A (16)	E (18)	A (16)	7.33
186019 14072	SRIJA SUR	B (28)	E (36)	A (24)	E (36)	A (32)	C (24)	E (18)	E (18)	E (18)	E (18)	E (18)	8.18
186019 14073	SRIJAN JOARDAR	F (8)	F (8)	D (15)	C (24)	F (8)	F (8)	B (14)	E (18)	E (18)	A (16)	E (18)	4.70
186019 14074	SRIJANI BISWAS	C (24)	E (36)	E (27)	O (40)	E (36)	B (28)	E (18)	A (16)	E (18)	E (18)	A (16)	8.39
186019 14075	SUBHAJIT BHANDARI	B (28)	E (36)	A (24)	O (40)	A (32)	C (24)	A (16)	E (18)	E (18)	E (18)	A (16)	8.18
186019 14076	SUBHAJIT DEY	D (20)	B (28)	A (24)	B (28)	C (24)	F (8)	A (16)	E (18)	A (16)	B (14)	E (18)	6.48
186019 14077	SUBHAJIT KARAK	C (24)	D (20)	B (21)	B (28)	D (20)	F (8)	A (16)	E (18)	B (14)	B (14)	E (18)	6.09
186019 14078	SUCHARITA CHOUDHURY	D (20)	D (20)	B (21)	B (28)	D (20)	F (8)	E (18)	E (18)	A (16)	E (18)	E (18)	6.21
186019 14079	SUMANA DAS	D (20)	D (20)	C (18)	C (24)	D (20)	F (8)	B (14)	B (14)	A (16)	A (16)	E (18)	5.70
186019 14080	SUMEL ASHIQUE	B (28)	E (36)	A (24)	E (36)	A (32)	I (8)	E (18)	E (18)	E (18)	E (18)	E (18)	7.70
186019 14081	SUMIT SAHA	B (28)	B (28)	B (21)	A (32)	B (28)	B (28)	O (20)	E (18)	A (16)	E (18)	O (20)	7.79
186019 14082	SUPRATIM DAS	C (24)	A (32)	B (21)	A (32)	A (32)	B (28)	E (18)	E (18)	E (18)	A (16)	E (18)	7.79
186019 14083	SUSMITA KAR	C (24)	A (32)	A (24)	E (36)	B (28)	B (28)	A (16)	E (18)	E (18)	E (18)	O (20)	7.94
186019 14084	SUSMITA ROY	C (24)	C (24)	B (21)	A (32)	D (20)	D (20)	E (18)	E (18)	A (16)	E (18)	E (18)	6.94
186019 14085	SUSMITA ROY	B (28)	B (28)	A (24)	A (32)	A (32)	C (24)	E (18)	E (18)	E (18)	A (16)	E (18)	7.76
186019 14086	SUTIRTHA DAS	C (24)	D (20)	A (24)	A (32)	B (28)	B (28)	E (18)	E (18)	E (18)	B (14)	O (20)	7.39
186019	SUVAJIT	F	I	D	B	F	F	B	B	A	B	E	4.5

14087	SANTRA	(8)	(8)	(15)	(28)	(8)	(8)	(14)	(14)	(16)	(14)	(18)	8
186019 14088	SWAGATA BAKSHI	B (28)	E (36)	A (24)	E (36)	C (24)	D (20)	B (14)	E (18)	E (18)	E (18)	E (18)	7.70
186019 14089	SWAGATA PAL	B (28)	C (24)	A (24)	A (32)	B (28)	C (24)	B (14)	E (18)	A (16)	A (16)	A (16)	7.27
186019 14090	SWARAJIT BARIK	F (8)	F (8)	D (15)	C (24)	F (8)	F (8)	B (14)	B (14)	B (14)	C (12)	A (16)	4.27
186019 14091	SWEETY PRASHANT	C (24)	A (32)	B (21)	E (36)	A (32)	B (28)	E (18)	O (20)	E (18)	E (18)	O (20)	8.09
186019 14092	TANDRIMA CHATTERJEE	A (32)	O (40)	E (27)	O (40)	E (36)	A (32)	E (18)	E (18)	O (20)	A (16)	O (20)	9.06
186019 14093	TANIA KHATOON	C (24)	B (28)	B (21)	A (32)	A (32)	D (20)	B (14)	E (18)	A (16)	A (16)	A (16)	7.18
186019 14094	TANMOY KUMAR SAHA	D (20)	F (8)	B (21)	A (32)	D (20)	D (20)	B (14)	E (18)	A (16)	B (14)	A (16)	6.03
186019 14095	TANMOY MAJI	D (20)	B (28)	B (21)	A (32)	C (24)	D (20)	A (16)	E (18)	A (16)	E (18)	O (20)	7.06
186019 14096	TANUSHREE CHATTERJEE	D (20)	C (24)	B (21)	A (32)	C (24)	C (24)	A (16)	E (18)	A (16)	A (16)	E (18)	6.94
186019 14097	TRISHA DEY DHARA	B (28)	A (32)	A (24)	E (36)	A (32)	C (24)	E (18)	E (18)	E (18)	A (16)	O (20)	8.06
186019 14098	TRISHA SEN	D (20)	B (28)	A (24)	A (32)	C (24)	D (20)	E (18)	E (18)	E (18)	A (16)	E (18)	7.15
186019 14099	TUHIN GHOSH	D (20)	D (20)	C (18)	B (28)	D (20)	F (8)	A (16)	E (18)	A (16)	A (16)	E (18)	6.00
186019 14100	UTTIYA DATTA	B (28)	A (32)	E (27)	A (32)	A (32)	D (20)	E (18)	E (18)	A (16)	A (16)	E (18)	7.79
186019 15122	AVA RANI SINHA	C (24)	A (32)	A (24)	B (28)	A (32)	C (24)	O (20)	O (20)	E (18)	O (20)	O (20)	7.94
186019 15123	AVINASH KUMAR	D (20)	C (24)	A (24)	C (24)	D (20)	F (8)	A (16)	B (14)	A (16)	B (14)	E (18)	6.00

186019 15124	KABIR HOSSAIN MALLICK	C (24)	A (32)	A (24)	B (28)	C (24)	D (20)	A (16)	A (16)	A (16)	A (16)	A (16)	7.0 3
186019 15125	KOUSHIK DUTTA	B (28)	A (32)	A (24)	A (32)	A (32)	C (24)	A (16)	A (16)	E (18)	A (16)	A (16)	7.7 0
186019 15126	MD ASIF	D (20)	D (20)	B (21)	D (20)	F (8)	D (20)	A (16)	B (14)	A (16)	B (14)	B (14)	5.5 5
186019 15127	MONIKAR NA DATTA	D (20)	C (24)	A (24)	C (24)	C (24)	F (8)	A (16)	B (14)	A (16)	B (14)	A (16)	6.0 6
186019 15128	NASIMA AKTAR	F (8)	F (8)	B (21)	D (20)	D (20)	F (8)	A (16)	B (14)	A (16)	B (14)	E (18)	4.9 4
186019 15129	NISHANT KUMAR	D (20)	D (20)	C (18)	D (20)	C (24)	F (8)	B (14)	B (14)	A (16)	A (16)	B (14)	5.5 8
186019 15130	PARTHA SARKAR	C (24)	B (28)	B (21)	A (32)	B (28)	D (20)	E (18)	A (16)	E (18)	A (16)	A (16)	7.1 8
186019 15131	POONAM BIKASH BISWAS	D (20)	C (24)	A (24)	B (28)	D (20)	D (20)	E (18)	E (18)	A (16)	A (16)	A (16)	6.6 7
186019 15132	PRATAP CHATTOPA DHYAY	D (20)	C (24)	B (21)	D (20)	D (20)	D (20)	A (16)	B (14)	A (16)	A (16)	B (14)	6.0 9
186019 15133	RAJU DEBNATH	F (8)	C (24)	B (21)	D (20)	C (24)	D (20)	A (16)	B (14)	B (14)	B (14)	B (14)	5.7 3
186019 15134	SABIR KHAN	D (20)	C (24)	B (21)	C (24)	B (28)	D (20)	A (16)	A (16)	A (16)	B (14)	A (16)	6.5 2
186019 15135	SHREYA BANIK	F (8)	D (20)	B (21)	D (20)	D (20)	F (8)	B (14)	B (14)	A (16)	B (14)	A (16)	5.1 8
186019 15136	SOMA GHOSH	D (20)	B (28)	B (21)	C (24)	C (24)	F (8)	A (16)	A (16)	A (16)	B (14)	B (14)	6.0 9
186019 15137	SRIJON MAJUMDE R	D (20)	F (8)	C (18)	C (24)	D (20)	D (20)	B (14)	C (12)	B (14)	B (14)	A (16)	5.4 5
186019 15138	SUBHASIS H SINHA	D (20)	D (20)	C (18)	C (24)	D (20)	F (8)	A (16)	B (14)	B (14)	B (14)	A (16)	5.5 8
186019 15139	SUBHRAJIT MAJUMDE	D (20)	D (20)	B (21)	C (24)	C (24)	D (20)	E (18)	A (16)	E (18)	E (18)	A (16)	6.5 2

ROLL NO.	NAME											
	R											
186019 15140	SWEETY GUPTA	C (24)	B (28)	B (21)	B (28)	B (28)	D (20)	A (16)	E (18)	A (16)	E (18)	E (18)	7.12

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT 301	PT 304	PT 305	PT 306	PT 307	CS 303	PT 391	PT 394	PT 396	PT 397	CS 393	SG PA
186019 12022	ATRI PAIN MAZUMDER	D (20)	D (20)	C (18)	D (20)	C (24)	D (20)	B (14)	B (14)	B (14)	E (18)	B (14)	5.94
186019 12027	BRATIN DAS	D (20)	D (20)	D (15)	D (20)	D (20)	F (8)	B (14)	B (14)	C (12)	B (14)	C (12)	5.12
186019 12037	EAKRSHI MALLICK	B (28)	C (24)	D (15)	D (20)	C (24)	C (24)	B (14)	A (16)	A (16)	C (12)	A (16)	6.33
186019 12076	ROUNAK DAS	B (28)	C (24)	B (21)	C (24)	B (28)	C (24)	A (16)	B (14)	A (16)	B (14)	E (18)	6.88
186019 12077	RUDRA NARAYAN HUI	C (24)	I (8)	D (15)	I (8)	C (24)	I (8)	C (12)	C (12)	C (12)	D (10)	B (14)	4.45
186019 12109	SUBHRAJIT GHOSH	D (20)	D (20)	C (18)	C (24)	D (20)	D (20)	A (16)	B (14)	A (16)	C (12)	A (16)	5.94
186019 12118	SUPROBHAT BHATTACHARJEE	B (28)	C (24)	C (18)	D (20)	C (24)	D (20)	A (16)	B (14)	A (16)	C (12)	A (16)	6.30
186019 12128	DEEP CHAKRABORTY	D (20)	D (20)	D (15)	C (24)	C (24)	D (20)	B (14)	C (12)	A (16)	C (12)	B (14)	5.79
186019 13001	AAMAN ROY	D (20)	D (20)	C (18)	D (20)	C (24)	D (20)	B (14)	A (16)	A (16)	A (16)	A (16)	6.06
186019 13009	ANIRBAN CHAKRABORTY	D (20)	D (20)	D (15)	D (20)	D (20)	D (20)	C (12)	C (12)	A (16)	B (14)	B (14)	5.55
186019 13010	ANIRBAN GHOSH	C (24)	C (24)	C (18)	D (20)	C (24)	D (20)	B (14)	B (14)	A (16)	A (16)	B (14)	6.18

186019 13011	ANIRUDDHA BHAR	I (8)	I (8)	D (15)	D (20)	D (20)	D (20)	B (14)	C (12)	A (16)	A (16)	B (14)	4.94
186019 13021	ARITRA GHOSH	C (24)	C (24)	C (18)	D (20)	C (24)	D (20)	B (14)	C (12)	A (16)	B (14)	A (16)	6.12
186019 13048	NAYAN KARMAKAR	D (20)	C (24)	C (18)	D (20)	C (24)	C (24)	B (14)	B (14)	B (14)	A (16)	A (16)	6.18
186019 13061	RATUL BANDURI	B (28)	B (28)	A (24)	C (24)	C (24)	D (20)	A (16)	A (16)	A (16)	E (18)	A (16)	6.97
186019 13081	SOHAM BHATTACHARYA	D (20)	D (20)	C (18)	D (20)	D (20)	C (24)	C (12)	B (14)	B (14)	C (12)	A (16)	5.76
186019 13086	SOUMYA DAS	D (20)	D (20)	B (21)	D (20)	D (20)	D (20)	A (16)	B (14)	B (14)	B (14)	B (14)	5.85
186019 13095	SUSMITA KOLEY	A (32)	C (24)	B (21)	D (20)	C (24)	D (20)	E (18)	A (16)	A (16)	B (14)	A (16)	6.70
186019 14105	DIPTARUP JANA	C (24)	D (20)	A (24)	D (20)	B (28)	C (24)	A (16)	B (14)	A (16)	B (14)	A (16)	6.55

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(formerly known as West Bengal University of Technology)

RESULT 2015-2016

College Name : GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY

For the THIRD YEAR FIRST SEMESTER EXAMINATION OF 2015-2016

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT5 03	PT5 04	PT5 06	PT5 07	PT5 08	PT5 09	PT5 93	PT5 96	PT5 97	PT5 99	SG PA
1860191 2077	RUDRA NARAYAN HUI	F (8)	C (18)	D (20)	C (18)	F (6)	C (18)	C (12)	B (14)	B (14)	A (16)	5.14
1860191 3001	AAMAN ROY	F (8)	D (15)	D (20)	D (15)	F (6)	F (6)	B (14)	A (16)	B (14)	A (16)	4.64
1860191 3002	ABANTIKA GHOSH	D (20)	A (24)	B (28)	D (15)	D (15)	C (18)	E (18)	A (16)	A (16)	E (18)	6.71
1860191 3003	ABHIRAJ PATHAK	D (20)	B (21)	A (32)	B (21)	B (21)	B (21)	A (16)	A (16)	A (16)	E (18)	7.21
1860191 3004	ABHIRUP DEY	F (8)	C (18)	C (24)	D (15)	C (18)	C (18)	E (18)	E (18)	E (18)	E (18)	6.18
1860191 3005	ABHIRUP SAHA	D (20)	B (21)	B (28)	B (21)	C (18)	A (24)	E (18)	A (16)	B (14)	E (18)	7.07
1860191 3006	ABHISHEK GUPTA	C (24)	A (24)	E (36)	A (24)	A (24)	A (24)	E (18)	E (18)	E (18)	O (20)	8.21
1860191	AINDRILA	C	A	A	B	B	A	E	E	E	O	7.86

3007	BHOWMICK	(24)	(24)	(32)	(21)	(21)	(24)	(18)	(18)	(18)	(20)	
18601913008	AISHWARYA DATTA	D (20)	B (21)	A (32)	B (21)	B (21)	A (24)	E (18)	A (16)	E (18)	O (20)	7.54
18601913009	ANIRBAN CHAKRABORTY	F (8)	D (15)	D (20)	D (15)	F (6)	D (15)	C (12)	C (12)	A (16)	A (16)	4.82
18601913010	ANIRBAN GHOSH	F (8)	C (18)	D (20)	D (15)	F (6)	A (24)	C (12)	C (12)	B (14)	B (14)	5.11
18601913011	ANIRUDDHA BHAR	F (8)	B (21)	C (24)	C (18)	F (6)	C (18)	A (16)	B (14)	B (14)	E (18)	5.61
18601913012	ANISH KUMAR PALIT	C (24)	A (24)	B (28)	B (21)	C (18)	C (18)	A (16)	A (16)	A (16)	E (18)	7.11
18601913013	ANJALI MONDAL	A (32)	E (27)	E (36)	E (27)	A (24)	A (24)	O (20)	E (18)	O (20)	O (20)	8.86
18601913014	ANKITA ACHARYA	C (24)	C (18)	B (28)	B (21)	D (15)	C (18)	E (18)	E (18)	E (18)	E (18)	7.00
18601913015	ANURAG TK BAIDYA	B (28)	C (18)	B (28)	B (21)	D (15)	B (21)	A (16)	E (18)	E (18)	O (20)	7.25
18601913016	APARUPA SINHA	C (24)	C (18)	D (20)	C (18)	F (6)	B (21)	E (18)	E (18)	B (14)	E (18)	6.25
18601913017	ARGHYA ROY	A (32)	A (24)	B (28)	A (24)	C (18)	A (24)	A (16)	A (16)	A (16)	E (18)	7.71
18601913018	ARIJIT MITRA THAKUR	B (28)	B (21)	B (28)	B (21)	D (15)	B (21)	A (16)	A (16)	B (14)	E (18)	7.07
18601913019	ARIJIT PRAMANIK	A (32)	B (21)	A (32)	B (21)	B (21)	A (24)	O (20)	E (18)	E (18)	E (18)	8.04
18601913020	ARINDAM CHATTERJEE	A (32)	C (18)	C (24)	B (21)	C (18)	B (21)	E (18)	E (18)	A (16)	E (18)	7.29
18601913021	ARITRA GHOSH	C (24)	B (21)	B (28)	D (15)	D (15)	C (18)	B (14)	A (16)	A (16)	A (16)	6.54
18601913022	ARUNAVA CHAKRABORTY	C (24)	A (24)	B (28)	C (18)	B (21)	A (24)	E (18)	E (18)	E (18)	E (18)	7.54

Roll	Name											Score
1860191 3023	ASWIN PATEL	B (28)	B (21)	B (28)	B (21)	C (18)	B (21)	E (18)	A (16)	A (16)	A (16)	7.25
1860191 3024	ATAUR RAHAMAN LASKAR	D (20)	B (21)	B (28)	B (21)	C (18)	B (21)	A (16)	A (16)	E (18)	A (16)	6.96
1860191 3026	BANTI SINGH	B (28)	B (21)	E (36)	A (24)	B (21)	A (24)	E (18)	E (18)	E (18)	E (18)	8.07
1860191 3027	CHAYAN GUIN	F (8)	A (24)	A (32)	B (21)	D (15)	A (24)	A (16)	A (16)	A (16)	A (16)	6.71
1860191 3028	DEBARATI BHATTACHARYA	B (28)	E (27)	E (36)	A (24)	B (21)	E (27)	O (20)	E (18)	O (20)	O (20)	8.61
1860191 3029	DEBJANI SAHA	C (24)	E (27)	E (36)	A (24)	A (24)	A (24)	E (18)	A (16)	A (16)	A (16)	8.04
1860191 3030	DEBOLINA MANNA	B (28)	A (24)	A (32)	A (24)	E (27)	A (24)	O (20)	E (18)	O (20)	E (18)	8.39
1860191 3032	DIBYOJYOTI CHATTERJEE	B (28)	E (27)	E (36)	A (24)	A (24)	A (24)	E (18)	A (16)	E (18)	E (18)	8.32
1860191 3033	DIPANJAN GHOSH	B (28)	A (24)	E (36)	A (24)	A (24)	A (24)	E (18)	A (16)	A (16)	A (16)	8.07
1860191 3034	DIPANKAR KAMILA	C (24)	C (18)	D (20)	C (18)	C (18)	C (18)	A (16)	A (16)	A (16)	E (18)	6.50
1860191 3035	DIPTARCO SINGHA	D (20)	B (21)	C (24)	B (21)	B (21)	B (21)	O (20)	E (18)	E (18)	E (18)	7.21
1860191 3036	DURJOY GHOSH	C (24)	E (27)	E (36)	A (24)	A (24)	E (27)	E (18)	A (16)	E (18)	E (18)	8.29
1860191 3037	HRISHAV ROYCHOWDHURY	B (28)	O (30)	A (32)	A (24)	B (21)	E (27)	O (20)	E (18)	O (20)	O (20)	8.57
1860191 3038	INDRANIL MUKHERJEE	B (28)	A (24)	B (28)	B (21)	B (21)	E (27)	E (18)	E (18)	E (18)	A (16)	7.82
1860191 3039	IPSITA GAYEN	B (28)	E (27)	E (36)	B (21)	A (24)	E (27)	E (18)	E (18)	E (18)	E (18)	8.39

1860191 3040	JOYATI GHOSH	C (24)	B (21)	B (28)	B (21)	C (18)	B (21)	E (18)	A (16)	A (16)	E (18)	7.18
1860191 3041	KABERI CHATTERJE E	A (32)	E (27)	A (32)	A (24)	A (24)	A (24)	O (20)	E (18)	O (20)	O (20)	8.61
1860191 3042	KHADEMUL ISLAM	F (8)	A (24)	B (28)	A (24)	B (21)	E (27)	A (16)	A (16)	E (18)	E (18)	7.14
1860191 3043	KUNTAL NANDY	B (28)	E (27)	B (28)	B (21)	C (18)	A (24)	A (16)	A (16)	A (16)	E (18)	7.57
1860191 3044	MANDIRA GHORAI	A (32)	E (27)	E (36)	A (24)	B (21)	E (27)	E (18)	E (18)	E (18)	O (20)	8.61
1860191 3045	MANPREET GHAI	C (24)	E (27)	A (32)	B (21)	B (21)	A (24)	E (18)	E (18)	A (16)	E (18)	7.82
1860191 3046	MD NAZMUL AHAMED MALLICK	B (28)	B (21)	B (28)	B (21)	D (15)	B (21)	A (16)	A (16)	E (18)	E (18)	7.21
1860191 3047	MOZAMME L HAQUE	B (28)	E (27)	B (28)	A (24)	D (15)	E (27)	A (16)	E (18)	E (18)	O (20)	7.89
1860191 3048	NAYAN KARMAKAR	B (28)	B (21)	C (24)	B (21)	F (6)	B (21)	B (14)	B (14)	B (14)	A (16)	6.39
1860191 3049	NILANJAN SAHA	C (24)	A (24)	B (28)	B (21)	B (21)	B (21)	A (16)	A (16)	A (16)	E (18)	7.32
1860191 3051	OLIVA JANA	A (32)	E (27)	E (36)	A (24)	A (24)	A (24)	E (18)	E (18)	E (18)	O (20)	8.61
1860191 3052	PALLABI SARKAR	A (32)	E (27)	E (36)	A (24)	A (24)	E (27)	E (18)	E (18)	E (18)	O (20)	8.71
1860191 3053	PAMOLITA PAUL	A (32)	E (27)	E (36)	A (24)	E (27)	A (24)	E (18)	E (18)	E (18)	E (18)	8.64
1860191 3054	POULAMI SARKAR	E (36)	E (27)	E (36)	A (24)	E (27)	A (24)	E (18)	E (18)	E (18)	O (20)	8.86
1860191 3055	PRITI KUNDU	A (32)	E (27)	O (40)	A (24)	A (24)	E (27)	E (18)	E (18)	E (18)	E (18)	8.79
1860191 3056	PRIYA BARDHAN RAY	E (36)	E (27)	E (36)	B (21)	A (24)	E (27)	E (18)	E (18)	E (18)	E (18)	8.68

18601913057	PRIYA DEY	B (28)	A (24)	B (28)	C (18)	B (21)	B (21)	A (16)	A (16)	E (18)	E (18)	7.43
18601913059	RAJDEEP SAHA	O (40)	O (30)	E (36)	A (24)	A (24)	E (27)	O (20)	O (20)	E (18)	O (20)	9.25
18601913060	RANIT PAUL	B (28)	B (21)	A (32)	C (18)	B (21)	A (24)	A (16)	E (18)	A (16)	E (18)	7.57
18601913061	RATUL BANDURI	C (24)	C (18)	B (28)	C (18)	C (18)	A (24)	A (16)	A (16)	A (16)	E (18)	7.00
18601913062	RINKEE GHOSH	B (28)	A (24)	B (28)	C (18)	E (27)	B (21)	A (16)	A (16)	A (16)	E (18)	7.57
18601913063	RITAM BAIRAGI	B (28)	B (21)	A (32)	A (24)	C (18)	B (21)	A (16)	A (16)	A (16)	E (18)	7.50
18601913064	RITAM CHOUDHURY	A (32)	E (27)	E (36)	B (21)	B (21)	A (24)	E (18)	E (18)	E (18)	O (20)	8.39
18601913065	RUDRADIP DAS	O (40)	E (27)	O (40)	E (27)	A (24)	A (24)	O (20)	E (18)	O (20)	O (20)	9.29
18601913066	SAMHITA KUMAR	A (32)	A (24)	E (36)	A (24)	B (21)	B (21)	A (16)	A (16)	A (16)	E (18)	8.00
18601913067	SAMPITA PAL	E (36)	O (30)	E (36)	A (24)	B (21)	A (24)	O (20)	O (20)	O (20)	O (20)	8.96
18601913068	SATABDI BASAK	D (20)	D (15)	A (32)	C (18)	B (21)	B (21)	A (16)	E (18)	A (16)	A (16)	6.89
18601913069	SAURAV CHAKRABORTY	B (28)	A (24)	B (28)	B (21)	A (24)	B (21)	A (16)	E (18)	E (18)	E (18)	7.71
18601913070	SAYAN DAS	A (32)	A (24)	A (32)	B (21)	A (24)	B (21)	A (16)	A (16)	A (16)	A (16)	7.79
18601913071	SAYAN SAHA	B (28)	C (18)	B (28)	B (21)	D (15)	C (18)	A (16)	A (16)	A (16)	E (18)	6.93
18601913073	SAYANI BANERJEE	B (28)	A (24)	D (20)	B (21)	B (21)	B (21)	E (18)	E (18)	A (16)	E (18)	7.32
18601913074	SAYANTAN DATTA	C (24)	A (24)	C (24)	C (18)	C (18)	D (15)	A (16)	A (16)	A (16)	A (16)	6.68
1860191	SHAHJAMA	B	B	B	B	B	C	A	A	A	A	7.18

3075	N HALDER	(28)	(21)	(28)	(21)	(21)	(18)	(16)	(16)	(16)	(16)	
1860191 3076	SHANTANE EL INDU	A (32)	E (27)	B (28)	B (21)	B (21)	B (21)	E (18)	A (16)	A (16)	E (18)	7.79
1860191 3077	SHARMISTH A DAS	A (32)	B (21)	A (32)	A (24)	A (24)	A (24)	A (16)	A (16)	E (18)	E (18)	8.04
1860191 3078	SHASHWAT A GHOSH	E (36)	A (24)	A (32)	A (24)	A (24)	A (24)	E (18)	E (18)	E (18)	E (18)	8.43
1860191 3079	SK ABDUL SALAM	E (36)	A (24)	A (32)	A (24)	A (24)	B (21)	E (18)	E (18)	A (16)	O (20)	8.32
1860191 3080	SNEHAM SEN	E (36)	A (24)	A (32)	A (24)	C (18)	B (21)	E (18)	A (16)	E (18)	E (18)	8.04
1860191 3081	SOHAM BHATTACH ARYA	F (8)	C (18)	D (20)	D (15)	D (15)	D (15)	C (12)	A (16)	B (14)	A (16)	5.32
1860191 3082	SOHAM CHATTERJE E	A (32)	E (27)	E (36)	A (24)	E (27)	A (24)	O (20)	E (18)	O (20)	O (20)	8.86
1860191 3083	SOUMAVA BHATTACH ARYA	A (32)	B (21)	A (32)	C (18)	B (21)	A (24)	E (18)	A (16)	E (18)	E (18)	7.79
1860191 3084	SOUMENDU MONDAL	D (20)	B (21)	A (32)	D (15)	C (18)	A (24)	A (16)	A (16)	A (16)	E (18)	7.00
1860191 3085	SOUMIK DEY	B (28)	A (24)	A (32)	C (18)	B (21)	A (24)	E (18)	E (18)	E (18)	O (20)	7.89
1860191 3086	SOUMYA DAS	D (20)	B (21)	C (24)	D (15)	C (18)	C (18)	B (14)	E (18)	A (16)	A (16)	6.43
1860191 3087	SOUMYADE EP BHATTACH ARYA	D (20)	B (21)	B (28)	C (18)	A (24)	A (24)	E (18)	A (16)	A (16)	E (18)	7.25
1860191 3088	SOUMYAJIT ROY	D (20)	B (21)	C (24)	C (18)	C (18)	A (24)	E (18)	E (18)	E (18)	E (18)	7.04
1860191 3089	SOUMYAJIT SINHA	D (20)	B (21)	B (28)	C (18)	C (18)	B (21)	A (16)	A (16)	A (16)	E (18)	6.86
1860191 3090	SUBHADIP CHAKRABO	C (24)	A (24)	A (32)	C (18)	C (18)	A (24)	E (18)	A (16)	A (16)	E (18)	7.43

	RTY										
1860191 3091	SUBHAJIT MANNA	B (28)	A (24)	A (32)	C (18)	B (21)	A (24)	O (20)	E (18)	E (18)	E (18)	7.89
1860191 3092	SUDEEPA PAUL	D (20)	D (15)	B (28)	C (18)	F (6)	B (21)	A (16)	A (16)	A (16)	E (18)	6.21
1860191 3093	SUDIPTA MANNA	B (28)	A (24)	D (20)	B (21)	D (15)	C (18)	A (16)	A (16)	A (16)	E (18)	6.86
1860191 3094	SUNANADA DEY	A (32)	E (27)	E (36)	A (24)	A (24)	A (24)	E (18)	E (18)	E (18)	O (20)	8.61
1860191 3095	SUSMITA KOLEY	C (24)	B (21)	C (24)	F (6)	F (6)	C (18)	A (16)	E (18)	A (16)	E (18)	5.96
1860191 3096	SWATI ABAT	A (32)	E (27)	E (36)	B (21)	B (21)	A (24)	O (20)	E (18)	E (18)	O (20)	8.46
1860191 3097	TANAYA PALIT	C (24)	C (18)	C (24)	D (15)	D (15)	C (18)	E (18)	A (16)	A (16)	E (18)	6.50
1860191 3099	TANMAY SAHA	E (36)	O (30)	O (40)	E (27)	E (27)	E (27)	O (20)	O (20)	O (20)	O (20)	9.54
1860191 3100	TANUMOY GHOSH	B (28)	A (24)	B (28)	C (18)	A (24)	B (21)	A (16)	A (16)	E (18)	A (16)	7.46
1860191 3101	TOUMICA GHOSH	A (32)	E (27)	B (28)	B (21)	A (24)	A (24)	O (20)	E (18)	E (18)	E (18)	8.21
1860191 4101	ARGHADEEP DEY	A (32)	A (24)	B (28)	C (18)	A (24)	C (18)	E (18)	B (14)	E (18)	E (18)	7.57
1860191 4102	ARPITA GHOSAL	E (36)	E (27)	E (36)	A (24)	E (27)	A (24)	O (20)	E (18)	O (20)	O (20)	9.00
1860191 4103	AVIRUP DAS	B (28)	C (18)	A (32)	C (18)	B (21)	C (18)	A (16)	A (16)	A (16)	A (16)	7.11
1860191 4104	DEBABRATA JANA	B (28)	C (18)	B (28)	C (18)	B (21)	C (18)	A (16)	E (18)	A (16)	E (18)	7.11
1860191 4105	DIPTARUP JANA	B (28)	B (21)	A (32)	B (21)	A (24)	B (21)	A (16)	A (16)	E (18)	E (18)	7.68
1860191 4106	LABANI SARKAR	A (32)	C (18)	A (32)	B (21)	A (24)	B (21)	A (16)	E (18)	A (16)	O (20)	7.79
1860191 4107	NILANJAN PARIA	B (28)	D (15)	B (28)	D (15)	B (21)	C (18)	A (16)	E (18)	B (14)	E (18)	6.82

1860191 4108	ONKAR CHATTERJEE	B (28)	C (18)	B (28)	C (18)	A (24)	A (24)	E (18)	B (14)	A (16)	O (20)	7.43
1860191 4109	PAROMITA DAS	B (28)	A (24)	A (32)	B (21)	A (24)	E (27)	E (18)	E (18)	A (16)	E (18)	8.07
1860191 4110	PAYEL BHATTACHARJEE	A (32)	E (27)	E (36)	A (24)	A (24)	E (27)	E (18)	A (16)	E (18)	O (20)	8.64
1860191 4111	RUCHI BHATTACHARYA	A (32)	A (24)	E (36)	A (24)	E (27)	E (27)	E (18)	E (18)	E (18)	E (18)	8.64
1860191 4112	SAYANI BANERJEE	A (32)	A (24)	A (32)	A (24)	E (27)	A (24)	E (18)	E (18)	E (18)	O (20)	8.46
1860191 4113	SUBHANKAR GHOSH	D (20)	F (6)	B (28)	B (21)	B (21)	C (18)	B (14)	A (16)	B (14)	A (16)	6.21

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT5 03	PT5 04	PT5 06	PT5 07	PT5 08	PT5 09	PT5 93	PT5 96	PT5 97	PT5 99	SG PA
1860191 2011	ARIJIT MONDAL	D (20)	C (18)	D (20)	D (15)	D (15)	D (15)	B (14)	A (16)	B (14)	B (14)	5.75
1860191 2012	ARIJIT MUKHERJEE	C (24)	C (18)	C (24)	B (21)	D (15)	D (15)	A (16)	A (16)	B (14)	C (12)	6.25
1860191 2013	ARINDAM MALLICK	C (24)	C (18)	D (20)	B (21)	D (15)	D (15)	A (16)	A (16)	C (12)	A (16)	6.18
1860191 2017	ARKO JYOTI HAZRA	D (20)	D (15)	D (20)	B (21)	D (15)	C (18)	A (16)	A (16)	B (14)	C (12)	5.96
1860191 2018	ARNAB BHUNIA	D (20)	B (21)	C (24)	B (21)	C (18)	D (15)	B (14)	A (16)	B (14)	B (14)	6.32
1860191 2019	ARNAB BISWAS	D (20)	D (15)	B (28)	A (24)	B (21)	D (15)	A (16)	A (16)	B (14)	B (14)	6.54
1860191 2020	ARNAB KANTI JANA	D (20)	C (18)	D (20)	C (18)	C (18)	D (15)	B (14)	A (16)	D (10)	C (12)	5.75
1860191 2021	ATANU MONDAL	D (20)	B (21)	D (20)	C (18)	D (15)	C (18)	B (14)	A (16)	C (12)	C (12)	5.93

1860191 2027	BRATIN DAS	F (8)	F (6)	F (8)	D (15)	D (15)	F (6)	C (12)	B (14)	C (12)	A (16)	4.00
1860191 2030	DEBANJAN MITRA	F (8)	D (15)	D (20)	D (15)	I (6)	D (15)	C (12)	B (14)	C (12)	C (12)	4.61
1860191 2033	DEBLINA DE	D (20)	A (24)	B (28)	C (18)	C (18)	C (18)	A (16)	E (18)	B (14)	A (16)	6.79
1860191 2037	EAKRSHI MALLICK	B (28)	D (15)	D (20)	D (15)	C (18)	C (18)	B (14)	A (16)	B (14)	B (14)	6.14
1860191 2043	HIRANMOY GHOSH	E (36)	B (21)	B (28)	B (21)	C (18)	C (18)	A (16)	A (16)	C (12)	B (14)	7.14
1860191 2047	KAUSTAV MITRA	C (24)	A (24)	B (28)	A (24)	B (21)	C (18)	A (16)	A (16)	A (16)	B (14)	7.18
1860191 2048	KRISHANU DUTTA	D (20)	C (18)	B (28)	B (21)	B (21)	D (15)	B (14)	A (16)	B (14)	B (14)	6.46
1860191 2050	KUNAL GHOSH	E (36)	C (18)	B (28)	C (18)	D (15)	D (15)	A (16)	A (16)	B (14)	C (12)	6.71
1860191 2051	LOKNATH MAJI	E (36)	D (15)	B (28)	B (21)	B (21)	D (15)	B (14)	A (16)	B (14)	B (14)	6.93
1860191 2056	MD NADEEM SHAH	D (20)	D (15)	C (24)	C (18)	D (15)	D (15)	A (16)	B (14)	C (12)	C (12)	5.75
1860191 2059	NILOTPAL GORAI	A (32)	B (21)	C (24)	B (21)	C (18)	C (18)	C (12)	A (16)	A (16)	B (14)	6.86
1860191 2066	RAJDEEP BANERJEE	C (24)	D (15)	D (20)	D (15)	C (18)	D (15)	A (16)	D (10)	C (12)	A (16)	5.75
1860191 2068	RAJIB SINGHAROY	C (24)	B (21)	C (24)	C (18)	C (18)	C (18)	B (14)	E (18)	B (14)	A (16)	6.61
1860191 2074	RITUPARNA DAS	C (24)	A (24)	A (32)	B (21)	B (21)	B (21)	B (14)	A (16)	B (14)	A (16)	7.25
1860191 2076	ROUNAK DAS	C (24)	B (21)	B (28)	C (18)	B (21)	D (15)	B (14)	A (16)	C (12)	A (16)	6.61
1860191 2079	SAIKAT GHOSH	D (20)	C (18)	B (28)	B (21)	B (21)	D (15)	B (14)	A (16)	B (14)	A (16)	6.54
1860191 2093	SOUMYA BANERJEE	B (28)	C (18)	D (20)	D (15)	A (24)	F (6)	B (14)	E (18)	B (14)	A (16)	6.18

1860191 2104	SUBHADIP DEY	B (28)	D (15)	C (24)	D (15)	B (21)	C (18)	B (14)	A (16)	A (16)	A (16)	6.54
1860191 2109	SUBHRAJIT GHOSH	C (24)	D (15)	C (24)	D (15)	C (18)	C (18)	B (14)	A (16)	B (14)	A (16)	6.21
1860191 2114	SUKHENDU MONDAL	A (32)	D (15)	D (20)	C (18)	C (18)	D (15)	A (16)	A (16)	B (14)	A (16)	6.43
1860191 2119	SURAJ LAHA	D (20)	B (21)	B (28)	B (21)	B (21)	B (21)	A (16)	A (16)	A (16)	A (16)	7.00
1860191 2125	UDITA GHOSH	B (28)	C (18)	B (28)	B (21)	B (21)	B (21)	B (14)	A (16)	A (16)	A (16)	7.11
1860191 3104	ANUPAM BHOWMIK	D (20)	C (18)	A (32)	C (18)	C (18)	D (15)	B (14)	A (16)	C (12)	A (16)	6.39
1860191 3105	ARNAB BHATTACH ARYYA	A (32)	D (15)	B (28)	C (18)	C (18)	D (15)	B (14)	A (16)	B (14)	A (16)	6.64
1860191 3108	MD MOKTAR HOSSAIN	A (32)	D (15)	B (28)	D (15)	D (15)	D (15)	C (12)	A (16)	B (14)	A (16)	6.36
1860191 3109	MRIDUL PAL	D (20)	D (15)	D (20)	C (18)	C (18)	D (15)	B (14)	A (16)	C (12)	A (16)	5.86

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(formerly known as West Bengal University of Technology)

RESULT 2015-2016

College Name : GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY

For the FOURTH YEAR FIRST SEMESTER EXAMINATION OF 2015-2016

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT702	PT703	PT706	PT708	PT709A /PT709B /PT709C	PT793	PT796	PT782	PT783	SGPA
1860191 2001	ABHINANDAN MONDAL	D (15)	C (18)	D (15)	D (15)	A (24)	A (16)	B (14)	E (18)	E (54)	7.00
1860191 2002	AHELI MUKHERJEE	E (27)	O (30)	B (21)	O (30)	E (27)	O (20)	O (20)	E (18)	E (54)	9.15
1860191 2003	AIESHI BHOWMICK	E (27)	A (24)	B (21)	E (27)	A (24)	E (18)	E (18)	E (18)	E (54)	8.56
1860191 2004	AISHIKA DATTA	E (27)	O (30)	A (24)	E (27)	E (27)	O (20)	O (20)	O (20)	O (60)	9.44
1860191 2005	ANGANA NASKAR	E (27)	B (21)	C (18)	C (18)	B (21)	A (16)	A (16)	A (16)	A (48)	7.44
1860191 2006	ANIRBAN ROY	E (27)	A (24)	B (21)	E (27)	E (27)	O (20)	E (18)	O (20)	O (60)	9.04
1860191	ANKUR	B	B	B	A	E (27)	O	E	O	O	8.59

2007	MONDAL	(21)	(21)	(21)	(24)		(20)	(18)	(20)	(60)	
1860191 2008	ANTARA ROY	B (21)	D (15)	C (18)	D (15)	A (24)	A (16)	A (16)	A (16)	A (48)	7.00
1860191 2009	ANURAG GHOSH	B (21)	D (15)	C (18)	D (15)	A (24)	A (16)	A (16)	E (18)	E (54)	7.30
1860191 2010	ARANI RAY	C (18)	C (18)	D (15)	F (6)	A (24)	A (16)	A (16)	E (18)	E (54)	6.85
1860191 2011	ARIJIT MONDAL	D (15)	B (21)	D (15)	F (6)	B (21)	A (16)	C (12)	E (18)	E (54)	6.59
1860191 2012	ARIJIT MUKHERJEE	A (24)	B (21)	D (15)	B (21)	B (21)	A (16)	A (16)	A (16)	A (48)	7.33
1860191 2013	ARINDAM MALLICK	C (18)	C (18)	F (6)	D (15)	B (21)	A (16)	B (14)	A (16)	A (48)	6.37
1860191 2014	ARITRA MAITRA	C (18)	D (15)	C (18)	F (6)	B (21)	A (16)	A (16)	A (16)	A (48)	6.44
1860191 2015	ARKA BAKSHI	B (21)	C (18)	C (18)	D (15)	B (21)	A (16)	A (16)	E (18)	E (54)	7.30
1860191 2016	ARKA MUKHERJEE	E (27)	B (21)	B (21)	C (18)	B (21)	A (16)	A (16)	A (16)	A (48)	7.56
1860191 2017	ARKO JYOTI HAZRA	B (21)	C (18)	C (18)	D (15)	A (24)	A (16)	B (14)	E (18)	E (54)	7.33
1860191 2018	ARNAB BHUNIA	A (24)	C (18)	C (18)	D (15)	B (21)	A (16)	A (16)	E (18)	E (54)	7.41
1860191 2019	ARNAB BISWAS	C (18)	C (18)	C (18)	D (15)	A (24)	A (16)	A (16)	O (20)	O (60)	7.59
1860191 2020	ARNAB KANTI JANA	C (18)	D (15)	F (6)	D (15)	B (21)	A (16)	B (14)	E (18)	E (54)	6.56
1860191 2021	ATANU MONDAL	B (21)	C (18)	D (15)	D (15)	B (21)	A (16)	B (14)	E (18)	E (54)	7.11
1860191 2022	ATRI PAIN MAZUMDER	B (21)	C (18)	C (18)	D (15)	B (21)	A (16)	B (14)	E (18)	E (54)	7.22
1860191 2023	AVIRUP DASGUPTA	B (21)	C (18)	C (18)	D (15)	A (24)	A (16)	A (16)	O (20)	O (60)	7.70
1860191 2024	AVISHEK CHAKRABOR	B (21)	C (18)	B (21)	C (18)	A (24)	A (16)	B (14)	O (20)	O (60)	7.85

	TY									
1860191 2025	BIMAN GUCHHAIT	B (21)	C (18)	C (18)	B (21)	C (18)	A (16)	B (14)	O (20)	O (60)	7.63
1860191 2026	BITAN DAS	C (18)	C (18)	D (15)	D (15)	B (21)	A (16)	B (14)	E (18)	E (54)	7.00
1860191 2027	BRATIN DAS	F (6)	F (6)	F (6)	F (6)	C (18)	B (14)	C (12)	A (16)	A (48)	4.89
1860191 2028	CHANDRIKA SAHA	E (27)	B (21)	C (18)	A (24)	B (21)	E (18)	E (18)	E (18)	E (54)	8.11
1860191 2029	DEBALINA DATTA	A (24)	B (21)	C (18)	A (24)	A (24)	E (18)	E (18)	E (18)	E (54)	8.11
1860191 2030	DEBANJAN MITRA	C (18)	D (15)	D (15)	F (6)	B (21)	B (14)	B (14)	A (16)	A (48)	6.19
1860191 2031	DEBANJANA DAS	C (18)	C (18)	C (18)	A (24)	A (24)	E (18)	E (18)	O (20)	O (60)	8.07
1860191 2032	DEBAYAN MISHRA	B (21)	C (18)	C (18)	B (21)	A (24)	A (16)	B (14)	E (18)	E (54)	7.56
1860191 2033	DEBLINA DE	C (18)	C (18)	D (15)	A (24)	A (24)	A (16)	E (18)	E (18)	E (54)	7.59
1860191 2034	DEBOLINA ROY	E (27)	B (21)	C (18)	A (24)	E (27)	E (18)	A (16)	O (20)	O (60)	8.56
1860191 2035	DEBSMITA SINGHA ROY	E (27)	C (18)	C (18)	A (24)	A (24)	A (16)	A (16)	E (18)	E (54)	7.96
1860191 2036	DIPAYAN NATH	A (24)	B (21)	C (18)	A (24)	B (21)	E (18)	A (16)	O (20)	O (60)	8.22
1860191 2037	EAKRSHI MALLICK	B (21)	D (15)	D (15)	A (24)	A (24)	A (16)	B (14)	A (16)	A (48)	7.15
1860191 2038	ENAKSHI GHOSH	E (27)	A (24)	B (21)	A (24)	A (24)	E (18)	B (14)	O (20)	O (60)	8.59
1860191 2039	EVANA PATRA	A (24)	B (21)	C (18)	E (27)	A (24)	E (18)	E (18)	O (20)	O (60)	8.52
1860191 2041	GOURAB DEY	B (21)	B (21)	C (18)	B (21)	B (21)	A (16)	A (16)	A (16)	A (48)	7.33
1860191 2042	HIMADRIJA CHATTERJEE	E (27)	A (24)	B (21)	A (24)	E (27)	O (20)	O (20)	O (20)	O (60)	9.00

18601912043	HIRANMOY GHOSH	B (21)	B (21)	C (18)	B (21)	A (24)	A (16)	A (16)	E (18)	E (54)	7.74
18601912044	INDIRA SAHA	B (21)	A (24)	C (18)	B (21)	B (21)	A (16)	A (16)	E (18)	E (54)	7.74
18601912045	INDRANIL PAUL	C (18)	D (15)	C (18)	B (21)	B (21)	A (16)	A (16)	E (18)	E (54)	7.30
18601912046	KAJAL	A (24)	B (21)	B (21)	E (27)	A (24)	A (16)	A (16)	O (20)	O (60)	8.48
18601912047	KAUSTAV MITRA	B (21)	B (21)	B (21)	A (24)	B (21)	A (16)	E (18)	O (20)	O (60)	8.22
18601912048	KRISHANU DUTTA	B (21)	B (21)	C (18)	A (24)	C (18)	A (16)	B (14)	E (18)	E (54)	7.56
18601912049	KRISHNAKALI BASU	B (21)	C (18)	C (18)	A (24)	C (18)	A (16)	E (18)	E (18)	E (54)	7.59
18601912050	KUNAL GHOSH	C (18)	C (18)	D (15)	B (21)	E (27)	A (16)	C (12)	E (18)	E (54)	7.37
18601912051	LOKNATH MAJI	B (21)	C (18)	D (15)	E (27)	B (21)	A (16)	A (16)	E (18)	E (54)	7.63
18601912052	MAINAK CHATTERJEE	O (30)	E (27)	A (24)	E (27)	A (24)	O (20)	E (18)	O (20)	O (60)	9.26
18601912053	MAITREYEE BANERJEE	A (24)	C (18)	C (18)	A (24)	E (27)	A (16)	A (16)	O (20)	O (60)	8.26
18601912054	MANISH SANTRA	C (18)	C (18)	F (6)	B (21)	C (18)	A (16)	A (16)	O (20)	O (60)	7.15
18601912055	MANOSHI GHOSH	B (21)	C (18)	D (15)	A (24)	E (27)	A (16)	E (18)	O (20)	O (60)	8.11
18601912056	MD NADEEM SHAH	D (15)	F (6)	F (6)	D (15)	A (24)	E (18)	A (16)	E (18)	E (54)	6.37
18601912057	NAMRATA GANGULY	A (24)	A (24)	B (21)	A (24)	E (27)	O (20)	O (20)	O (20)	O (60)	8.89
18601912059	NILOTPAL GORAI	C (18)	B (21)	C (18)	B (21)	A (24)	A (16)	A (16)	O (20)	O (60)	7.93
18601912060	PAMI SARKAR	D (15)	C (18)	D (15)	C (18)	C (18)	A (16)	A (16)	E (18)	E (54)	6.96
1860191	PARAG ROY	E	E	B	E	E (27)	E	E	O	O	9.07

2061		(27)	(27)	(21)	(27)		(18)	(18)	(20)	(60)	
1860191 2062	PARTHA PRATIM KHATUA	E (27)	E (27)	C (18)	E (27)	B (21)	A (16)	A (16)	E (18)	E (54)	8.30
1860191 2063	PRIYADARSH INI DUTTA	A (24)	B (21)	C (18)	B (21)	B (21)	A (16)	A (16)	E (18)	E (54)	7.74
1860191 2064	PRIYANKA DE	E (27)	O (30)	A (24)	E (27)	A (24)	O (20)	O (20)	O (20)	O (60)	9.33
1860191 2065	PUJA ADHIKARY	E (27)	E (27)	B (21)	O (30)	E (27)	O (20)	O (20)	E (18)	E (54)	9.04
1860191 2066	RAJDEEP BANERJEE	F (6)	D (15)	D (15)	B (21)	A (24)	B (14)	A (16)	A (16)	A (48)	6.48
1860191 2067	RAJDEEP DEY	A (24)	E (27)	B (21)	A (24)	B (21)	O (20)	O (20)	O (20)	O (60)	8.78
1860191 2068	RAJIB SINGHAROY	B (21)	A (24)	D (15)	A (24)	B (21)	A (16)	A (16)	E (18)	E (54)	7.74
1860191 2069	RAJSEKHAR ROY	B (21)	E (27)	C (18)	A (24)	B (21)	E (18)	O (20)	E (18)	E (54)	8.19
1860191 2070	RAMITA BANERJEE	B (21)	B (21)	B (21)	A (24)	B (21)	E (18)	O (20)	O (20)	O (60)	8.37
1860191 2071	REEMI GUPTA	B (21)	A (24)	C (18)	A (24)	C (18)	E (18)	E (18)	O (20)	O (60)	8.19
1860191 2072	RINIK NANDY	B (21)	B (21)	D (15)	C (18)	B (21)	E (18)	E (18)	A (16)	A (48)	7.26
1860191 2073	RITIKA SINHA	A (24)	A (24)	B (21)	B (21)	E (27)	E (18)	O (20)	E (18)	E (54)	8.41
1860191 2074	RITUPARNA DAS	B (21)	A (24)	B (21)	A (24)	E (27)	A (16)	A (16)	A (16)	A (48)	7.89
1860191 2075	RIYA TARAN	D (15)	B (21)	C (18)	B (21)	B (21)	A (16)	E (18)	O (20)	O (60)	7.78
1860191 2076	ROUNAK DAS	D (15)	C (18)	C (18)	C (18)	B (21)	A (16)	A (16)	A (16)	A (48)	6.89
1860191 2078	SAIKAT DAS	D (15)	A (24)	D (15)	A (24)	C (18)	B (14)	A (16)	E (18)	E (54)	7.33
1860191	SAIKAT	B	C	B	B	B (21)	B	E	O	O	7.93

2079	GHOSH	(21)	(18)	(21)	(21)		(14)	(18)	(20)	(60)	
1860191 2080	SAIPAYAN SAHA	B (21)	E (27)	B (21)	A (24)	C (18)	A (16)	A (16)	E (18)	E (54)	7.96
1860191 2081	SAKSHAR SAHA	E (27)	E (27)	A (24)	O (30)	E (27)	O (20)	O (20)	E (18)	E (54)	9.15
1860191 2082	SAKSHI JHA	E (27)	A (24)	B (21)	E (27)	B (21)	O (20)	O (20)	O (20)	O (60)	8.89
1860191 2084	SATADAL DEB ROY	C (18)	A (24)	C (18)	A (24)	B (21)	A (16)	A (16)	O (20)	O (60)	8.04
1860191 2085	SATHI PAUL	B (21)	B (21)	C (18)	C (18)	B (21)	A (16)	A (16)	A (16)	A (48)	7.22
1860191 2086	SAYANTAN GOSWAMI	C (18)	C (18)	B (21)	B (21)	A (24)	E (18)	E (18)	E (18)	E (54)	7.78
1860191 2087	SHILAJIT MONDAL	B (21)	D (15)	C (18)	C (18)	B (21)	A (16)	A (16)	A (16)	A (48)	7.00
1860191 2088	SHREYA SANYAL	E (27)	B (21)	B (21)	A (24)	O (30)	E (18)	O (20)	E (18)	E (54)	8.63
1860191 2089	SHREYASEE MITRA	E (27)	B (21)	C (18)	B (21)	A (24)	A (16)	E (18)	A (16)	A (48)	7.74
1860191 2090	SHRIYA RAY	A (24)	B (21)	B (21)	C (18)	C (18)	A (16)	O (20)	E (18)	E (54)	7.78
1860191 2091	SK SAJJAT ALI	C (18)	B (21)	C (18)	B (21)	E (27)	A (16)	E (18)	A (16)	A (48)	7.52
1860191 2092	SMARANJEET BANIK	C (18)	B (21)	C (18)	B (21)	A (24)	A (16)	E (18)	O (20)	O (60)	8.00
1860191 2093	SOUMYA BANERJEE	D (15)	D (15)	D (15)	D (15)	A (24)	B (14)	A (16)	A (16)	A (48)	6.59
1860191 2094	SOUMYA GUHA	B (21)	A (24)	C (18)	E (27)	C (18)	E (18)	O (20)	O (20)	O (60)	8.37
1860191 2095	SOUMYADRI CHAKRABORTY	A (24)	A (24)	C (18)	E (27)	C (18)	O (20)	O (20)	O (20)	O (60)	8.56
1860191 2096	SOURABH SAHA	B (21)	B (21)	B (21)	C (18)	E (27)	A (16)	E (18)	O (20)	O (60)	8.22
1860191	SOURAV	B	B	B	C	A (24)	A	E	A	A	7.52

2097	GUHA	(21)	(21)	(21)	(18)		(16)	(18)	(16)	(48)	
1860191 2098	SOURAV KUNDU	C (18)	B (21)	C (18)	C (18)	C (18)	A (16)	A (16)	A (16)	A (48)	7.00
1860191 2099	SOUVIK DAS	B (21)	B (21)	C (18)	C (18)	A (24)	E (18)	E (18)	O (20)	O (60)	8.07
1860191 2100	SUBARNA GANGULY	C (18)	D (15)	D (15)	C (18)	A (24)	E (18)	E (18)	E (18)	E (54)	7.33
1860191 2101	SUBHADEEP DEY	C (18)	C (18)	C (18)	C (18)	E (27)	A (16)	E (18)	A (16)	A (48)	7.30
1860191 2102	SUBHADEEP JANA	D (15)	C (18)	C (18)	C (18)	B (21)	A (16)	E (18)	A (16)	A (48)	6.96
1860191 2103	SUBHADIP DAS	B (21)	A (24)	B (21)	B (21)	E (27)	E (18)	E (18)	O (20)	O (60)	8.52
1860191 2104	SUBHADIP DEY	D (15)	C (18)	D (15)	C (18)	B (21)	A (16)	E (18)	A (16)	A (48)	6.85
1860191 2105	SUBHAJIT SARKAR	B (21)	B (21)	D (15)	D (15)	B (21)	A (16)	A (16)	A (16)	A (48)	7.00
1860191 2106	SUBHAM GHOSAL	B (21)	B (21)	D (15)	C (18)	E (27)	E (18)	O (20)	E (18)	E (54)	7.85
1860191 2108	SUBHOJIT BARAL	A (24)	A (24)	C (18)	A (24)	A (24)	E (18)	E (18)	A (16)	A (48)	7.93
1860191 2109	SUBHRAJIT GHOSH	C (18)	C (18)	D (15)	D (15)	C (18)	A (16)	A (16)	E (18)	E (54)	6.96
1860191 2110	SUCHETANA DUTTA	B (21)	B (21)	C (18)	C (18)	E (27)	E (18)	O (20)	O (20)	O (60)	8.26
1860191 2111	SUDIPTA RANI BERA	A (24)	A (24)	D (15)	B (21)	B (21)	A (16)	A (16)	A (16)	A (48)	7.44
1860191 2112	SUDIPTO SARKAR	E (27)	A (24)	C (18)	A (24)	A (24)	A (16)	E (18)	O (20)	O (60)	8.56
1860191 2113	SUJIT KUMAR CHAKRABOR TY	C (18)	A (24)	D (15)	B (21)	C (18)	A (16)	E (18)	E (18)	E (54)	7.48
1860191 2114	SUKHENDU MONDAL	C (18)	C (18)	F (6)	F (6)	C (18)	B (14)	A (16)	A (16)	A (48)	5.93

1860191 2115	SUMAN KANRAR	A (24)	E (27)	C (18)	B (21)	B (21)	E (18)	E (18)	E (18)	E (54)	8.11
1860191 2116	SUMANA SAHA	O (30)	E (27)	B (21)	E (27)	A (24)	E (18)	O (20)	O (20)	O (60)	9.15
1860191 2117	SUMIT BERA	B (21)	C (18)	D (15)	D (15)	E (27)	A (16)	E (18)	A (16)	A (48)	7.19
1860191 2118	SUPROBHAT BHATTACHARJEE	B (21)	C (18)	D (15)	D (15)	C (18)	A (16)	E (18)	E (18)	E (54)	7.15
1860191 2119	SURAJ LAHA	B (21)	B (21)	B (21)	C (18)	A (24)	A (16)	A (16)	A (16)	A (48)	7.44
1860191 2120	SUSMI SEN	A (24)	E (27)	A (24)	A (24)	A (24)	E (18)	O (20)	E (18)	O (60)	8.85
1860191 2121	TAMAL KHAN	C (18)	C (18)	D (15)	C (18)	B (21)	A (16)	E (18)	E (18)	E (54)	7.26
1860191 2122	TANIA KARMAKAR	O (30)	E (27)	B (21)	A (24)	E (27)	E (18)	O (20)	O (20)	O (60)	9.15
1860191 2123	TANMOY DAS BISWAS	C (18)	B (21)	C (18)	B (21)	A (24)	A (16)	A (16)	A (16)	E (54)	7.56
1860191 2124	TILOTTAMA BHATTACHARYA	A (24)	O (30)	E (27)	A (24)	E (27)	O (20)	O (20)	O (20)	O (60)	9.33
1860191 2125	UDITA GHOSH	C (18)	B (21)	C (18)	C (18)	A (24)	B (14)	A (16)	E (18)	E (54)	7.44
1860191 2126	UDITA MAJUMDER	B (21)	C (18)	D (15)	B (21)	A (24)	A (16)	E (18)	O (20)	O (60)	7.89
1860191 3102	ADITYA SEN	B (21)	B (21)	A (24)	C (18)	A (24)	A (16)	E (18)	E (18)	E (54)	7.93
1860191 3103	ANANYA SENGUPTA	A (24)	A (24)	B (21)	B (21)	A (24)	E (18)	E (18)	O (20)	O (60)	8.52
1860191 3104	ANUPAM BHOWMIK	B (21)	B (21)	C (18)	B (21)	A (24)	A (16)	A (16)	A (16)	A (48)	7.44
1860191 3105	ARNAB BHATTACHARYYA	C (18)	C (18)	D (15)	C (18)	B (21)	A (16)	C (12)	A (16)	A (48)	6.74

1860191 3106	ARPAN BERA	C (18)	C (18)	D (15)	B (21)	B (21)	E (18)	O (20)	E (18)	E (54)	7.52
1860191 3107	KOUSHIK KUMAR PATRA	B (21)	B (21)	B (21)	B (21)	A (24)	E (18)	O (20)	E (18)	E (54)	8.07
1860191 3108	MD MOKTAR HOSSAIN	C (18)	D (15)	D (15)	B (21)	A (24)	A (16)	A (16)	A (16)	A (48)	7.00
1860191 3109	MRIDUL PAL	C (18)	D (15)	D (15)	B (21)	B (21)	A (16)	E (18)	E (18)	E (54)	7.26
1860191 3110	NIDHI TIWARI	C (18)	B (21)	D (15)	B (21)	B (21)	A (16)	A (16)	A (16)	A (48)	7.11
1860191 3112	RIYA BHATTACHA RJEE	C (18)	B (21)	D (15)	B (21)	D (15)	A (16)	A (16)	A (16)	A (48)	6.89
1860191 3113	SAIKAT DAS	C (18)	C (18)	D (15)	A (24)	B (21)	A (16)	E (18)	E (18)	E (54)	7.48
1860191 3114	SOUMITA BANERJEE	A (24)	E (27)	A (24)	E (27)	E (27)	E (18)	E (18)	E (18)	E (54)	8.78
1860191 3115	TANIA MAITY	A (24)	A (24)	B (21)	E (27)	B (21)	A (16)	E (18)	E (18)	E (54)	8.26
1860191 3116	TANIYA GHOSH	A (24)	A (24)	B (21)	E (27)	C (18)	E (18)	E (18)	E (18)	E (54)	8.22

ANNEXURE-1B

UNIVERSITY RESULTS 2015-16

EVEN SEMESTER

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(formerly known as West Bengal University of Technology)

RESULT 2015-2016

College Name : **GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY**

For the FIRST YEAR SECOND SEMESTER EXAMINATION OF 2015-2016

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT2 03	M2 03	PT2 04	HU2 02	PT2 02	PT2 05	PT2 93	PT2 94	PT2 92	PT2 95	SGP A1	SGP A2	YG PA	DG PA
1860191 2011	ARIJIT MONDAL	C (24)	D (20)	C (24)	D (15)	D (15)	D (15)	A (16)	B (14)	C (12)	A (16)	5.79	5.90	5.85	0.00
1860191 2027	BRATIN DAS	D (20)	F (8)	F (8)	D (15)	D (15)	D (15)	B (14)	B (14)	B (14)	B (14)	5.54	4.72	5.09	0.00
1860191 2030	DEBANJAN MITRA	F (8)	D (20)	F (8)	D (15)	D (15)	D (15)	C (12)	C (12)	C (12)	C (12)	5.79	4.45	5.06	0.00
1860191 2087	SHILAJIT MONDAL	C (24)	C (24)	B (28)	B (21)	B (21)	C (18)	A (16)	A (16)	A (16)	A (16)	7.67	6.90	7.25	0.00
1860191 2107	SUBHAM MONDAL	F (8)	F (8)	F (8)	D (15)	F (6)	B (21)	B (14)	B (14)	C (12)	C (12)	5.29	4.07	4.62	0.00
1860191 2109	SUBHRAJIT GHOSH	C (24)	D (20)	F (8)	C (18)	F (6)	C (18)	A (16)	B (14)	A (16)	A (16)	5.88	5.38	5.60	0.00
1860191 3086	SOUMYA DAS	D (20)	F (8)	D (20)	C (18)	C (18)	D (15)	B (14)	A (16)	A (16)	A (16)	5.54	5.55	5.55	0.00
1860191 5001	ABHIJIT DAS	B (28)	O (40)	E (36)	E (27)	E (27)	O (30)	O (20)	O (20)	O (20)	O (20)	8.79	9.24	9.04	0.00
1860191 5002	ABHINAV KUMAR JHA	B (28)	A (32)	B (28)	A (24)	E (27)	A (24)	A (16)	E (18)	E (18)	E (18)	7.38	8.03	7.74	0.00
1860191 5003	ABHISHEK KUMAR	C (24)	A (32)	B (28)	A (24)	B (21)	B (21)	A (16)	A (16)	E (18)	O (20)	7.50	7.59	7.55	0.00

	SINGH														
1860191 5004	ABU SUFIAN.	C (24)	A (32)	C (24)	B (21)	D (15)	C (18)	A (16)	A (16)	A (16)	E (18)	7.17	6.90	7.02	0.00
1860191 5005	ADRIJA JHA	A (32)	E (36)	B (28)	E (27)	A (24)	E (27)	O (20)	O (20)	O (20)	O (20)	9.00	8.76	8.87	0.00
1860191 5006	ADRITA BOSE	C (24)	A (32)	C (24)	B (21)	A (24)	E (27)	E (18)	E (18)	E (18)	O (20)	8.42	7.79	8.08	0.00
1860191 5007	AKASH KUMAR SAMANTA	F (8)	A (32)	B (28)	C (18)	B (21)	C (18)	A (16)	A (16)	E (18)	E (18)	5.63	6.66	6.19	0.00
1860191 5008	ALISHA AGARWAL	A (32)	O (40)	A (32)	E (27)	E (27)	E (27)	E (18)	E (18)	E (18)	O (20)	8.92	8.93	8.92	0.00
1860191 5009	ANANYA CHOWDHURY	A (32)	A (32)	B (28)	E (27)	A (24)	A (24)	E (18)	E (18)	O (20)	O (20)	8.67	8.38	8.51	0.00
1860191 5010	ANIK MANDAL	D (20)	B (28)	F (8)	B (21)	A (24)	B (21)	A (16)	A (16)	A (16)	E (18)	7.17	6.48	6.79	0.00
1860191 5011	ANIK MUKHERJEE	B (28)	A (32)	B (28)	A (24)	A (24)	A (24)	E (18)	E (18)	O (20)	E (18)	8.17	8.07	8.11	0.00
1860191 5012	ANIKET DEY	F (8)	F (8)	F (8)	F (6)	F (6)	F (6)	F (4)	I (4)	I (4)	D (10)	2.00	2.21	2.11	0.00
1860191 5013	ANIMESH PAUL	B (28)	B (28)	D (20)	C (18)	C (18)	C (18)	A (16)	A (16)	E (18)	E (18)	6.79	6.83	6.81	0.00
1860191 5014	ANISH MUKHERJEE	B (28)	E (36)	C (24)	B (21)	A (24)	B (21)	A (16)	E (18)	E (18)	E (18)	8.08	7.72	7.89	0.00
1860191 5015	ANWESHA CHAKRABORTY	B (28)	B (28)	B (28)	B (21)	A (24)	E (27)	E (18)	E (18)	O (20)	E (18)	6.79	7.93	7.42	0.00
1860191 5036	DEBANGANA BHATTACHARYYA	B (28)	B (28)	A (32)	A (24)	E (27)	B (21)	E (18)	E (18)	E (18)	E (18)	8.00	8.00	8.00	0.00
1860191 5037	DEBJIT GHOSH	F (8)	C (24)	F (8)	D (15)	C (18)	F (6)	C (12)	E (18)	B (14)	A (16)	5.13	4.79	4.94	0.00
1860191 5038	DIPANWITA CHOWDHURY	C (24)	A (32)	C (24)	B (21)	B (21)	B (21)	E (18)	E (18)	E (18)	E (18)	6.88	7.41	7.17	0.00
1860191 5039	DIPJYOTI GHOSH	F (8)	F (8)	B (28)	C (18)	D (15)	D (15)	B (14)	E (18)	B (14)	B (14)	4.83	5.24	5.06	0.00
1860191 5040	DIPPYOMAN GUHA	C (24)	C (24)	B (28)	B (21)	B (21)	C (18)	A (16)	E (18)	A (16)	A (16)	7.04	6.97	7.00	0.00
1860191 5041	EMAMUL MOULA	C (24)	B (28)	A (32)	A (24)	A (24)	A (24)	A (16)	E (18)	A (16)	E (18)	7.25	7.72	7.51	0.00
1860191	GOBINDO	F (	A (	C (	C (	C (	C (	B (	E (	E (	A (	6.29	6.34	6.32	0.00

5043	DAS KUNDU	8)	32)	24)	18)	18)	18)	14)	18)	18)	16)				
1860191 5044	GOURAB BANIK	C (24)	A (32)	A (32)	C (18)	C (18)	C (18)	E (18)	E (18)	E (18)	E (18)	7.00	7.38	7.21	0.00
1860191 5045	HIMON BISWAS	F (8)	F (8)	C (24)	C (18)	F (6)	C (18)	A (16)	E (18)	E (18)	A (16)	6.21	5.17	5.64	0.00
1860191 5046	IMON GHOSH	D (20)	B (28)	C (24)	D (15)	F (6)	C (18)	E (18)	E (18)	E (18)	A (16)	6.79	6.24	6.49	0.00
1860191 5047	INDRANIL DE	B (28)	C (24)	A (32)	A (24)	A (24)	E (27)	E (18)	E (18)	O (20)	E (18)	7.21	8.03	7.66	0.00
1860191 5048	IPSITA BHATTACHA RJEE	B (28)	A (32)	E (36)	A (24)	B (21)	A (24)	A (16)	E (18)	E (18)	E (18)	8.42	8.10	8.25	0.00
1860191 5049	ISHITA SEN	C (24)	A (32)	A (32)	A (24)	A (24)	A (24)	O (20)	E (18)	E (18)	E (18)	8.25	8.07	8.15	0.00
1860191 5050	IVY SAHA	C (24)	B (28)	A (32)	B (21)	B (21)	B (21)	E (18)	E (18)	O (20)	E (18)	8.21	7.62	7.89	0.00
1860191 5051	KAUSTAV DAS	C (24)	D (20)	A (32)	B (21)	C (18)	A (24)	E (18)	E (18)	E (18)	A (16)	7.25	7.21	7.23	0.00
1860191 5052	KAUSTAV HALDAR	D (20)	C (24)	D (20)	C (18)	C (18)	C (18)	E (18)	E (18)	E (18)	E (18)	7.00	6.55	6.75	0.00
1860191 5096	SEMANTI PAUL	E (36)	B (28)	A (32)	A (24)	E (27)	A (24)	E (18)	E (18)	O (20)	O (20)	8.25	8.52	8.40	0.00
1860191 5097	SHABAZ KHAN	D (20)	D (20)	D (20)	B (21)	C (18)	C (18)	E (18)	A (16)	E (18)	E (18)	6.25	6.45	6.36	0.00
1860191 5098	SHAYAAN ALAM	D (20)	I (8)	D (20)	B (21)	D (15)	C (18)	C (12)	A (16)	C (12)	C (12)	6.71	5.31	5.94	0.00
1860191 5099	SHEERSHO NEOGI	C (24)	F (8)	F (8)	C (18)	D (15)	D (15)	C (12)	A (16)	C (12)	C (12)	5.71	4.83	5.23	0.00
1860191 5100	SHOVON GHOSH	D (20)	A (32)	D (20)	C (18)	D (15)	D (15)	B (14)	E (18)	E (18)	E (18)	6.17	6.48	6.34	0.00
1860191 5101	SHREE JISHNU PATRA	C (24)	D (20)	F (8)	C (18)	D (15)	F (6)	B (14)	A (16)	C (12)	C (12)	5.29	5.00	5.13	0.00
1860191 5102	SIRSHASIS DEB	B (28)	B (28)	A (32)	B (21)	A (24)	C (18)	A (16)	E (18)	E (18)	E (18)	7.17	7.62	7.42	0.00
1860191 5103	SK TAUSIF UDDIN	F (8)	C (24)	D (20)	D (15)	D (15)	F (6)	A (16)	E (18)	A (16)	A (16)	5.13	5.31	5.23	0.00
1860191 5104	SNEHA SARKAR	E (36)	A (32)	E (36)	A (24)	O (30)	E (27)	O (20)	O (20)	O (20)	O (20)	8.29	9.14	8.75	0.00
1860191 5105	SOHAM RAY	A (32)	B (28)	B (28)	A (24)	E (27)	E (27)	E (18)	E (18)	O (20)	E (18)	7.67	8.28	8.00	0.00
1860191 5106	SOUBHIK SAHA	C (24)	A (32)	B (28)	B (21)	B (21)	D (15)	A (16)	E (18)	E (18)	A (16)	6.21	7.21	6.75	0.00

Roll	Name														
1860191 5107	SOUMAJIT BAG	C (24)	F (8)	D (20)	B (21)	B (21)	D (15)	A (16)	E (18)	E (18)	E (18)	6.38	6.17	6.26	0.00
1860191 5108	SOUNAK PAUL	B (28)	B (28)	C (24)	E (27)	B (21)	B (21)	E (18)	E (18)	E (18)	E (18)	7.33	7.62	7.49	0.00
1860191 5109	SOUNOK SENGUPTA	B (28)	C (24)	B (28)	B (21)	C (18)	C (18)	A (16)	O (20)	E (18)	A (16)	5.88	7.14	6.57	0.00
1860191 5110	SOURAV NAYAK	C (24)	B (28)	C (24)	A (24)	D (15)	B (21)	B (14)	E (18)	A (16)	A (16)	6.21	6.90	6.58	0.00
1860191 5111	SOURIK MONDAL	D (20)	D (20)	D (20)	C (18)	C (18)	C (18)	B (14)	E (18)	B (14)	B (14)	5.04	6.00	5.57	0.00
1860191 5112	SOUVIK KUMAR SARKAR	B (28)	C (24)	C (24)	A (24)	B (21)	B (21)	A (16)	E (18)	E (18)	E (18)	6.63	7.31	7.00	0.00
1860191 5113	SREEPAYON CHATTERJEE	D (20)	D (20)	C (24)	A (24)	D (15)	C (18)	B (14)	E (18)	A (16)	B (14)	5.25	6.31	5.83	0.00
1860191 5114	SRIJITA SEN	A (32)	E (36)	O (40)	E (27)	E (27)	E (27)	O (20)	O (20)	O (20)	O (20)	8.63	9.28	8.98	0.00
1860191 5115	SUBHA SAHA	C (24)	B (28)	B (28)	A (24)	B (21)	B (21)	A (16)	E (18)	E (18)	A (16)	5.96	7.38	6.74	0.00
1860191 5116	SUBHADEEP GHOSH	B (28)	B (28)	B (28)	A (24)	A (24)	B (21)	A (16)	E (18)	E (18)	E (18)	6.75	7.69	7.26	0.00
1860191 5117	SUMAN DUTTA	C (24)	D (20)	B (28)	A (24)	B (21)	B (21)	A (16)	E (18)	E (18)	E (18)	6.67	7.17	6.94	0.00
1860191 5118	SUNAYAN PAL	C (24)	D (20)	C (24)	A (24)	B (21)	B (21)	A (16)	E (18)	E (18)	E (18)	6.33	7.03	6.72	0.00
1860191 5119	SUSHMITA GHOSH	B (28)	D (20)	B (28)	B (21)	B (21)	A (24)	E (18)	O (20)	O (20)	E (18)	7.67	7.52	7.58	0.00
1860191 5120	SUSHMITA GUHA	A (32)	A (32)	A (32)	A (24)	A (24)	E (27)	E (18)	O (20)	O (20)	E (18)	8.50	8.52	8.51	0.00
1860191 5121	TABREZ KHAN	F (8)	I (8)	C (24)	B (21)	I (6)	I (6)	F (4)	A (16)	F (4)	F (4)	5.25	3.48	4.28	0.00
1860191 5016	ARANYA PATRA	D (20)	A (32)	D (20)	C (18)	D (15)	C (18)	A (16)	E (18)	E (18)	A (16)	6.75	6.59	6.66	0.00
1860191 5017	ARITRA MUKHERJEE	F (8)	F (8)	F (8)	D (15)	D (15)	F (6)	C (12)	A (16)	B (14)	A (16)	4.54	4.07	4.28	0.00
1860191 5018	ARKA CHOWDHURY	B (28)	A (32)	E (36)	B (21)	B (21)	A (24)	E (18)	E (18)	E (18)	E (18)	7.46	8.07	7.79	0.00
1860191 5019	ARKAJYOTI SEN	B (28)	C (24)	E (36)	E (27)	A (24)	A (24)	E (18)	A (16)	E (18)	E (18)	8.33	8.03	8.17	0.00
1860191 5020	ARNAB GHOSH	C (24)	E (36)	A (32)	A (24)	B (21)	B (21)	E (18)	E (18)	O (20)	E (18)	7.00	8.00	7.55	0.00
1860191	ARNAB	D (	B (	B (	B (	B (	C (	E (	E (	E (	E (	7.71	7.17	7.42	0.00

5021	SAHA	20)	28)	28)	21)	21)	18)	18)	18)	18)	18)				
18601915022	ARPAN CHATTERJEE	C (24)	A (32)	B (28)	C (18)	C (18)	C (18)	A (16)	E (18)	E (18)	A (16)	6.33	7.10	6.75	0.00
18601915023	ARUN GUPTA	B (28)	A (32)	A (32)	B (21)	B (21)	B (21)	E (18)	E (18)	O (20)	E (18)	8.04	7.90	7.96	0.00
18601915024	AUNKITA BISWAS	D (20)	C (24)	C (24)	B (21)	C (18)	C (18)	A (16)	E (18)	O (20)	E (18)	6.71	6.79	6.75	0.00
18601915025	AYAN GOSWAMI	F (8)	D (20)	D (20)	F (6)	D (15)	F (6)	C (12)	A (16)	B (14)	A (16)	4.54	4.59	4.57	0.00
18601915026	BEDABRATA RAY	B (28)	A (32)	E (36)	A (24)	A (24)	B (21)	O (20)	E (18)	O (20)	O (20)	8.29	8.38	8.34	0.00
18601915027	BIDARVA DAS	D (20)	D (20)	B (28)	A (24)	B (21)	C (18)	A (16)	E (18)	E (18)	E (18)	6.38	6.93	6.68	0.00
18601915028	BIKASH GAYEN	C (24)	A (32)	A (32)	B (21)	B (21)	C (18)	E (18)	E (18)	E (18)	E (18)	6.42	7.59	7.06	0.00
18601915029	BINDU KUNDU	D (20)	C (24)	B (28)	B (21)	C (18)	C (18)	A (16)	E (18)	E (18)	E (18)	6.17	6.86	6.55	0.00
18601915030	BIPASHA MUKHERJEE	D (20)	B (28)	C (24)	C (18)	C (18)	D (15)	B (14)	A (16)	E (18)	E (18)	6.33	6.52	6.43	0.00
18601915031	BIPLAB DEY	C (24)	A (32)	C (24)	B (21)	B (21)	D (15)	A (16)	E (18)	E (18)	E (18)	6.50	7.14	6.85	0.00
18601915032	BISHWAJEET BERA	C (24)	B (28)	C (24)	A (24)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	8.00	7.48	7.72	0.00
18601915033	BISWADIP NAG	D (20)	B (28)	C (24)	B (21)	C (18)	D (15)	A (16)	E (18)	E (18)	E (18)	6.83	6.76	6.79	0.00
18601915034	CHANDRAMA MALLICK	C (24)	C (24)	B (28)	B (21)	B (21)	B (21)	A (16)	E (18)	E (18)	E (18)	7.75	7.21	7.45	0.00
18601915035	CHAYAN DAS	F (8)	F (8)	D (20)	D (15)	F (6)	F (6)	C (12)	E (18)	C (12)	B (14)	4.33	4.10	4.21	0.00
18601915053	KOYAL GHOSH	B (28)	A (32)	E (36)	A (24)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	6.96	8.17	7.62	0.00
18601915054	KUSAL MUKHERJEE	F (8)	F (8)	F (8)	D (15)	F (6)	F (6)	B (14)	C (12)	B (14)	A (16)	6.17	3.69	4.81	0.00
18601915056	MANISHA JHA	B (28)	O (40)	A (32)	A (24)	E (27)	A (24)	O (20)	O (20)	O (20)	E (18)	8.42	8.72	8.58	0.00
18601915057	MANODIPA GHOSH	C (24)	C (24)	B (28)	A (24)	B (21)	B (21)	E (18)	O (20)	E (18)	E (18)	7.29	7.45	7.38	0.00
18601915058	MARUF BILLA AKUNJEE	D (20)	E (36)	A (32)	C (18)	D (15)	D (15)	E (18)	E (18)	E (18)	E (18)	6.83	7.17	7.02	0.00
18601915059	MD MOJAFFAR MOLLA	F (8)	D (20)	D (20)	D (15)	D (15)	F (6)	B (14)	A (16)	A (16)	A (16)	6.33	5.03	5.62	0.00

1860191 5060	MIR SAMIM ALI	D (20)	A (32)	B (28)	B (21)	B (21)	C (18)	A (16)	E (18)	E (18)	A (16)	7.54	7.17	7.34	0.00
1860191 5061	MOHOJIT CHAKRABOR TY	C (24)	B (28)	B (28)	A (24)	B (21)	A (24)	B (14)	E (18)	E (18)	A (16)	6.13	7.41	6.83	0.00
1860191 5062	MRINMAY DAS	F (8)	C (24)	C (24)	B (21)	D (15)	B (21)	A (16)	E (18)	A (16)	A (16)	6.88	6.17	6.49	0.00
1860191 5063	NEPAL HAZRA	F (8)	D (20)	D (20)	C (18)	D (15)	C (18)	B (14)	B (14)	B (14)	A (16)	6.25	5.41	5.79	0.00
1860191 5064	NIYATI JAIN	B (28)	E (36)	E (36)	A (24)	A (24)	A (24)	O (20)	E (18)	O (20)	O (20)	7.71	8.62	8.21	0.00
1860191 5065	PALASH SAHU	D (20)	D (20)	D (20)	B (21)	D (15)	C (18)	B (14)	A (16)	A (16)	A (16)	5.96	6.07	6.02	0.00
1860191 5066	PARMITA ROY	B (28)	B (28)	B (28)	A (24)	D (15)	C (18)	B (14)	A (16)	A (16)	A (16)	5.54	7.00	6.34	0.00
1860191 5067	PAROMITA SENGUPTA	E (36)	C (24)	B (28)	A (24)	B (21)	B (21)	E (18)	E (18)	A (16)	A (16)	6.96	7.66	7.34	0.00
1860191 5068	PARTHIBA GHOSH	C (24)	C (24)	C (24)	A (24)	B (21)	B (21)	A (16)	E (18)	E (18)	A (16)	7.79	7.10	7.42	0.00
1860191 5069	PIJUSH KANTI BANGAL	C (24)	F (8)	C (24)	B (21)	C (18)	D (15)	A (16)	E (18)	A (16)	A (16)	5.96	6.07	6.02	0.00
1860191 5070	PRATYAY CHATTERJEE	F (8)	C (24)	C (24)	C (18)	D (15)	C (18)	A (16)	A (16)	A (16)	A (16)	5.79	5.90	5.85	0.00
1860191 5071	PRITHA JANAH	O (40)	A (32)	E (36)	B (21)	C (18)	A (24)	O (20)	O (20)	E (18)	O (20)	7.67	8.59	8.17	0.00
1860191 5072	PRIYANJALI BISWAS	D (20)	I (8)	D (20)	B (21)	D (15)	C (18)	C (12)	A (16)	B (14)	B (14)	6.79	5.45	6.06	0.00
1860191 5073	PRIYANKA NATH	B (28)	B (28)	D (20)	A (24)	B (21)	B (21)	O (20)	E (18)	E (18)	A (16)	6.25	7.38	6.87	0.00
1860191 5074	PRIYANKA ROY	B (28)	D (20)	D (20)	A (24)	C (18)	A (24)	E (18)	O (20)	E (18)	E (18)	6.04	7.17	6.66	0.00
1860191 5075	RANIT KANJILAL	E (36)	E (36)	B (28)	B (21)	B (21)	B (21)	O (20)	E (18)	A (16)	A (16)	7.67	8.03	7.87	0.00
1860191 5076	RAYASHA DAS	E (36)	C (24)	A (32)	E (27)	A (24)	E (27)	O (20)	E (18)	E (18)	O (20)	7.04	8.48	7.83	0.00
1860191 5077	REHENA SULTANA	C (24)	C (24)	D (20)	B (21)	D (15)	C (18)	A (16)	E (18)	A (16)	A (16)	6.38	6.48	6.43	0.00
1860191 5078	RISHAV NAG	E (36)	D (20)	A (32)	A (24)	A (24)	A (24)	E (18)	E (18)	E (18)	E (18)	7.42	8.00	7.74	0.00
1860191 5079	RITAM BASAK	F (8)	C (24)	C (24)	C (18)	D (15)	C (18)	A (16)	A (16)	A (16)	A (16)	6.75	5.90	6.28	0.00
1860191	RITIK	F (	F (	F (	F (6	F (	F (	F (	D (	D (	B (	3.42	2.76	3.06	0.00

5080	MISHRA	8)	8)	8)	)	6)	6)	4)	10)	10)	14)			
18601915081	ROUNAK RAM	F (8)	D (20)	F (8)	D (15)	D (15)	F (6)	E (18)	A (16)	A (16)	A (16)	5.54	4.76	5.11	0.00
18601915082	RUPAM DAS	F (8)	D (20)	F (8)	D (15)	D (15)	D (15)	A (16)	A (16)	A (16)	A (16)	4.21	5.00	4.64	0.00
18601915083	RUPANTAR SAMANTA	F (8)	D (20)	F (8)	C (18)	D (15)	F (6)	A (16)	A (16)	B (14)	A (16)	5.50	4.72	5.08	0.00
18601915084	SAGAR MAITI	E (36)	A (32)	A (32)	A (24)	A (24)	B (21)	O (20)	O (20)	O (20)	E (18)	8.54	8.52	8.53	0.00
18601915085	SAIKAT SAMANTA	F (8)	F (8)	F (8)	C (18)	F (6)	F (6)	F (4)	A (16)	D (10)	D (10)	4.83	3.24	3.96	0.00
18601915086	SAJAL KAR	F (8)	F (8)	F (8)	C (18)	D (15)	D (15)	B (14)	A (16)	A (16)	A (16)	4.58	4.62	4.60	0.00
18601915087	SAMBRITA CHATTERJEE	E (36)	B (28)	C (24)	A (24)	A (24)	A (24)	O (20)	E (18)	E (18)	E (18)	7.75	8.07	7.92	0.00
18601915088	SANCHITA ADHIKARY	E (36)	A (32)	E (36)	A (24)	E (27)	B (21)	O (20)	O (20)	E (18)	E (18)	7.79	8.69	8.28	0.00
18601915089	SANJIB CHAKRABORTY	A (32)	E (36)	A (32)	B (21)	B (21)	C (18)	E (18)	E (18)	E (18)	E (18)	6.79	8.00	7.45	0.00
18601915090	SATYABRATA KUNDU	A (32)	E (36)	B (28)	B (21)	A (24)	C (18)	E (18)	E (18)	O (20)	E (18)	7.58	8.03	7.83	0.00
18601915092	SAYAK NANDY	A (32)	C (24)	D (20)	C (18)	A (24)	B (21)	A (16)	E (18)	A (16)	A (16)	7.00	7.07	7.04	0.00
18601915093	SAYAN SARKAR	B (28)	C (24)	D (20)	B (21)	C (18)	C (18)	A (16)	E (18)	A (16)	A (16)	5.79	6.72	6.30	0.00
18601915094	SAYANI BHAUMIK	F (8)	D (20)	F (8)	C (18)	D (15)	D (15)	A (16)	E (18)	A (16)	A (16)	6.08	5.17	5.58	0.00
18601915095	SELIM AHAMMED SELIM	D (20)	C (24)	D (20)	B (21)	C (18)	D (15)	E (18)	E (18)	E (18)	E (18)	5.67	6.55	6.15	0.00

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(formerly known as West Bengal University of Technology)

RESULT 2015-2016

College Name : **GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY**

For the **SECOND YEAR SECOND SEMESTER EXAMINATION OF 2015-2016**

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT4 06	PT4 02	PT4 04	PT4 05	PT4 07	PT4 96	PT4 92	PT4 97	PT4 94	SGP A3	SGP A4	YG PA	DG PA	RESU LT
1860191 2011	ARIJIT MONDAL	D (20)	F (8)	C (24)	D (20)	C (24)	E (18)	E (18)	E (18)	C (12)	5.97	5.79	5.89	0.00	XP
1860191 2027	BRATIN DAS	D (20)	F (8)	D (20)	F (8)	I (8)	C (12)	C (12)	C (12)	C (12)	5.12	4.00	4.61	0.00	XP
1860191 2076	ROUNAK DAS	C (24)	C (24)	A (32)	B (28)	D (20)	A (16)	A (16)	E (18)	A (16)	6.88	6.93	6.90	0.00	P
1860191 2093	SOUMYA BANERJEE	C (24)	F (8)	D (20)	D (20)	F (8)	B (14)	A (16)	A (16)	B (14)	5.85	5.00	5.46	0.00	XP
1860191 2107	SUBHAM MONDAL	F (8)	F (8)	D (20)	F (8)	F (8)	E (18)	E (18)	A (16)	A (16)	5.67	4.29	5.03	0.00	XP
1860191 2109	SUBHRAJIT GHOSH	D (20)	C (24)	D (20)	D (20)	D (20)	A (16)	A (16)	B (14)	A (16)	5.94	5.93	5.93	0.00	XP
1860191 4001	ABDUR RAHAMAN	D (20)	D (20)	D (20)	C (24)	C (24)	A (16)	A (16)	B (14)	A (16)	5.70	6.07	5.87	0.00	XP
1860191 4002	ABHISHEK SINGH	C (24)	A (32)	D (20)	C (24)	C (24)	A (16)	E (18)	A (16)	B (14)	7.18	6.71	6.97	0.00	P
1860191 4004	ADITYADEB GHOSH	A (32)	E (36)	D (20)	A (32)	C (24)	E (18)	O (20)	E (18)	E (18)	6.70	7.79	7.20	0.00	XP
1860191 4005	ALONGKRIT DEY	F (8)	F (8)	F (8)	C (24)	F (8)	B (14)	B (14)	B (14)	B (14)	2.85	4.00	3.38	0.00	XP

1860191 4006	ALVEE BEGUM	A (32)	E (36)	C (24)	C (24)	C (24)	O (20)	E (18)	E (18)	E (18)	7.42	7.64	7.52	0.00	XP
1860191 4007	AMIT KUMAR	A (32)	E (36)	B (28)	B (28)	B (28)	E (18)	E (18)	E (18)	A (16)	7.82	7.93	7.87	0.00	P
1860191 4008	ANINDYA SUNDAR DAS	B (28)	B (28)	C (24)	C (24)	C (24)	E (18)	E (18)	A (16)	A (16)	7.39	7.00	7.21	0.00	P
1860191 4009	ANKAN RAY	B (28)	D (20)	D (20)	C (24)	C (24)	E (18)	A (16)	B (14)	A (16)	6.73	6.43	6.59	0.00	XP
1860191 4010	ANKIT CHOWDHURY	B (28)	O (40)	B (28)	B (28)	B (28)	O (20)	E (18)	E (18)	E (18)	8.39	8.07	8.25	0.00	P
1860191 4011	ANKUR SEN	B (28)	B (28)	C (24)	A (32)	B (28)	E (18)	O (20)	E (18)	E (18)	8.30	7.64	8.00	0.00	P
1860191 4012	ANURITA SARKAR	B (28)	E (36)	B (28)	B (28)	C (24)	O (20)	O (20)	E (18)	E (18)	7.64	7.86	7.74	0.00	XP
1860191 4013	APRATIM PAL	C (24)	D (20)	C (24)	C (24)	D (20)	A (16)	I (4)	A (16)	A (16)	6.94	5.86	6.44	0.00	XP
1860191 4014	ARNAB CHAKRABARTI	B (28)	C (24)	D (20)	C (24)	C (24)	E (18)	E (18)	E (18)	A (16)	6.67	6.79	6.72	0.00	P
1860191 4015	ARNAB MONDAL	B (28)	C (24)	D (20)	C (24)	C (24)	A (16)	E (18)	E (18)	A (16)	7.67	6.71	7.23	0.00	P
1860191 4016	ARNAB SARKAR	A (32)	E (36)	B (28)	A (32)	C (24)	O (20)	E (18)	E (18)	E (18)	8.00	8.07	8.03	0.00	P
1860191 4017	ASIF IQBAL	B (28)	B (28)	C (24)	B (28)	F (8)	A (16)	A (16)	A (16)	B (14)	7.24	6.36	6.84	0.00	XP
1860191 4018	AVINANDA DEY	E (36)	O (40)	A (32)	A (32)	A (32)	O (20)	O (20)	E (18)	O (20)	9.24	8.93	9.10	0.00	P
1860191 4019	AVISHEK GUCHAIT	D (20)	B (28)	F (8)	C (24)	D (20)	E (18)	A (16)	E (18)	B (14)	7.30	5.93	6.67	0.00	XP
1860191 4020	BISWAJIT CHOWDHURY	D (20)	F (8)	D (20)	D (20)	C (24)	A (16)	A (16)	A (16)	B (14)	6.55	5.50	6.07	0.00	XP
1860191 4021	BUSHRA SHABNAM	C (24)	E (36)	C (24)	B (28)	D (20)	E (18)	E (18)	E (18)	E (18)	7.85	7.29	7.59	0.00	P
1860191 4022	DEBANGSU NANDY	C (24)	D (20)	D (20)	B (28)	C (24)	E (18)	E (18)	E (18)	A (16)	6.76	6.64	6.70	0.00	XP
1860191 4023	DEBARGHA DATTA	E (36)	E (36)	C (24)	E (36)	A (32)	O (20)	O (20)	O (20)	O (20)	8.76	8.71	8.74	0.00	P
1860191 4024	DEBOSMITA DATTA	E (36)	E (36)	C (24)	A (32)	C (24)	O (20)	O (20)	E (18)	E (18)	8.24	8.14	8.20	0.00	P
1860191	DEEP	E (	O (	B (	A (	A (	E (	E (	O (	E (	8.42	8.64	8.52	0.00	P

Roll	Name														
4025	ROHAN CHATTERJEE	36)	40)	28)	32)	32)	18)	18)	20)	18)					
18601914026	DIPAN CHATTERJEE	B (28)	A (32)	D (20)	B (28)	C (24)	E (18)	A (16)	E (18)	E (18)	6.91	7.21	7.05	0.00	P
18601914027	GOURAV SAMAJDAR	B (28)	A (32)	C (24)	B (28)	B (28)	O (20)	O (20)	E (18)	E (18)	7.55	7.71	7.62	0.00	P
18601914028	HIMADRI PODDAR	E (36)	E (36)	C (24)	A (32)	C (24)	O (20)	E (18)	O (20)	E (18)	7.67	8.14	7.89	0.00	P
18601914029	IMRUL KAYES	D (20)	D (20)	D (20)	C (24)	F (8)	A (16)	E (18)	E (18)	A (16)	5.61	5.71	5.66	0.00	XP
18601914030	INDRAJIT THAKUR	A (32)	E (36)	A (32)	E (36)	A (32)	O (20)	O (20)	O (20)	O (20)	9.00	8.86	8.93	0.00	P
18601914031	ISANI DUTTA	A (32)	B (28)	C (24)	B (28)	C (24)	E (18)	E (18)	E (18)	E (18)	8.00	7.43	7.74	0.00	P
18601914032	JAGGUMANTRI SHRAVANTHI	B (28)	E (36)	B (28)	B (28)	D (20)	E (18)	E (18)	E (18)	E (18)	8.64	7.57	8.15	0.00	P
18601914033	JAYITA ROY	A (32)	A (32)	B (28)	C (24)	C (24)	E (18)	A (16)	E (18)	E (18)	7.82	7.50	7.67	0.00	P
18601914034	KARTICK KOLEY	D (20)	C (24)	D (20)	F (8)	F (8)	A (16)	A (16)	A (16)	B (14)	4.67	5.07	4.85	0.00	XP
18601914035	KAUSTAV BHATTACHARYA	F (8)	C (24)	D (20)	D (20)	F (8)	I (4)	A (16)	A (16)	B (14)	6.03	4.64	5.39	0.00	XP
18601914036	KAUSTAV PAL	B (28)	A (32)	C (24)	B (28)	C (24)	E (18)	A (16)	E (18)	A (16)	8.30	7.29	7.84	0.00	P
18601914037	MADHURIMA SAMANTA	B (28)	A (32)	C (24)	C (24)	C (24)	A (16)	E (18)	E (18)	A (16)	7.15	7.14	7.15	0.00	XP
18601914038	MAHULI MANNA	C (24)	B (28)	C (24)	C (24)	D (20)	A (16)	E (18)	E (18)	E (18)	6.88	6.79	6.84	0.00	P
18601914039	MANAJIT NAHA	D (20)	B (28)	D (20)	F (8)	F (8)	B (14)	E (18)	A (16)	A (16)	6.03	5.29	5.69	0.00	XP
18601914040	MANOJIT DUTTA	F (8)	F (8)	D (20)	F (8)	F (8)	A (16)	B (14)	B (14)	B (14)	4.00	3.93	3.97	0.00	XP
18601914041	MAUTAN ROY	B (28)	A (32)	C (24)	A (32)	C (24)	E (18)	E (18)	O (20)	E (18)	7.82	7.64	7.74	0.00	P
18601914042	MOHONA BHATTACHARJEE	A (32)	E (36)	B (28)	B (28)	B (28)	O (20)	O (20)	O (20)	E (18)	7.94	8.21	8.07	0.00	P
1860191	MUDASSAR	B (	C (	D (	C (	D (	E (	E (	A (	A (	7.00	6.57	6.80	0.00	P

4043	MANNAN	28)	24)	20)	24)	20)	18)	18)	16)	16)				
1860191 4044	NASRIN KHATUN	A (32)	E (36)	B (28)	A (32)	E (36)	E (18)	O (20)	O (20)	E (18)	8.09	8.57	8.31	0.00	P
1860191 4045	NEHA DAS	E (36)	E (36)	B (28)	A (32)	E (36)	O (20)	O (20)	E (18)	E (18)	8.64	8.71	8.67	0.00	P
1860191 4046	NILADRI SEKHAR MONDAL	F (8)	F (8)	F (8)	F (8)	F (8)	A (16)	A (16)	B (14)	B (14)	4.85	3.57	4.26	0.00	XP
1860191 4047	NILANJANA GHOSH	A (32)	A (32)	C (24)	B (28)	C (24)	E (18)	O (20)	A (16)	A (16)	7.27	7.50	7.38	0.00	XP
1860191 4048	NIRMITA GUPTA	D (20)	C (24)	D (20)	C (24)	B (28)	E (18)	E (18)	A (16)	A (16)	5.85	6.57	6.18	0.00	XP
1860191 4049	NIRUPAN GUPTA	D (20)	F (8)	F (8)	D (20)	D (20)	A (16)	A (16)	A (16)	B (14)	4.91	4.93	4.92	0.00	XP
1860191 4050	NISHA KOLEY	E (36)	E (36)	A (32)	A (32)	A (32)	E (18)	E (18)	O (20)	E (18)	8.15	8.64	8.38	0.00	P
1860191 4051	POULAMI DAS	A (32)	E (36)	B (28)	B (28)	B (28)	O (20)	O (20)	E (18)	E (18)	7.88	8.14	8.00	0.00	P
1860191 4052	PRIYANKA KUMARI	B (28)	A (32)	C (24)	B (28)	C (24)	E (18)	E (18)	E (18)	A (16)	7.06	7.36	7.20	0.00	XP
1860191 4053	RASHMITA BISWAS	A (32)	E (36)	A (32)	A (32)	A (32)	E (18)	E (18)	O (20)	O (20)	8.21	8.57	8.38	0.00	P
1860191 4054	RITUSHREE BAG	B (28)	A (32)	D (20)	B (28)	C (24)	E (18)	E (18)	A (16)	E (18)	6.67	7.21	6.92	0.00	XP
1860191 4055	RIYA SABNAM	B (28)	E (36)	B (28)	A (32)	E (36)	E (18)	E (18)	E (18)	E (18)	7.61	8.29	7.92	0.00	P
1860191 4056	ROHAN SAMANTA	D (20)	B (28)	D (20)	B (28)	F (8)	A (16)	A (16)	A (16)	B (14)	6.36	5.93	6.16	0.00	XP
1860191 4057	ROSHNI BHATTACHARYA	I (8)	D (20)	F (8)	B (28)	I (8)	C (12)	C (12)	C (12)	C (12)	6.61	4.29	5.54	0.00	XP
1860191 4058	ROUNAK DAS	B (28)	B (28)	C (24)	B (28)	C (24)	O (20)	O (20)	O (20)	E (18)	7.97	7.50	7.75	0.00	P
1860191 4059	SABNAM PARVEEN	C (24)	B (28)	D (20)	B (28)	D (20)	B (14)	E (18)	E (18)	A (16)	5.33	6.64	5.93	0.00	XP
1860191 4060	SANKHA DASGUPTA	C (24)	A (32)	C (24)	C (24)	F (8)	B (14)	A (16)	B (14)	B (14)	7.06	6.07	6.61	0.00	XP
1860191 4061	SASWATA MUKHERJEE	B (28)	B (28)	D (20)	C (24)	C (24)	E (18)	A (16)	E (18)	A (16)	6.21	6.86	6.51	0.00	XP
1860191 4062	SAYAN CHATTERJEE	B (28)	B (28)	D (20)	B (28)	C (24)	E (18)	E (18)	E (18)	E (18)	7.24	7.14	7.20	0.00	XP
1860191	SAYANTAN	B (	B (	D (	B (	D (	A (	E (	E (	A (	6.58	6.86	6.70	0.00	XP

Roll	Name													
4063	DAS	28)	28)	20)	28)	20)	16)	18)	18)	16)					
18601914064	SHOUVIK KUMAR DEBNATH	B (28)	C (24)	D (20)	B (28)	C (24)	E (18)	E (18)	E (18)	A (16)	7.36	6.93	7.16	0.00	P
18601914065	SHREYA BANERJEE	A (32)	E (36)	C (24)	B (28)	A (32)	O (20)	E (18)	E (18)	E (18)	7.36	8.07	7.69	0.00	P
18601914066	SK. MD. HARUN	C (24)	B (28)	C (24)	C (24)	B (28)	E (18)	E (18)	E (18)	A (16)	6.85	7.07	6.95	0.00	XP
18601914067	SNEHA BAG	B (28)	E (36)	B (28)	B (28)	A (32)	O (20)	E (18)	O (20)	O (20)	8.00	8.21	8.10	0.00	P
18601914068	SOMNATH DIAN	A (32)	A (32)	B (28)	B (28)	C (24)	A (16)	E (18)	A (16)	A (16)	7.09	7.50	7.28	0.00	P
18601914069	SOUMYASIS GUPTA	A (32)	E (36)	A (32)	E (36)	E (36)	O (20)	O (20)	O (20)	E (18)	8.64	8.93	8.77	0.00	P
18601914070	SOURAV MAITY	C (24)	A (32)	C (24)	B (28)	D (20)	A (16)	A (16)	E (18)	A (16)	5.48	6.93	6.15	0.00	XP
18601914072	SRIJA SUR	B (28)	E (36)	B (28)	E (36)	A (32)	O (20)	O (20)	O (20)	O (20)	8.18	8.57	8.36	0.00	P
18601914073	SRIJAN JOARDAR	F (8)	D (20)	F (8)	F (8)	F (8)	B (14)	A (16)	A (16)	B (14)	4.70	4.00	4.38	0.00	XP
18601914074	SRIJANI BISWAS	A (32)	E (36)	B (28)	B (28)	B (28)	O (20)	O (20)	O (20)	O (20)	8.39	8.29	8.34	0.00	P
18601914075	SUBHAJIT BHANDARI	A (32)	E (36)	A (32)	A (32)	C (24)	O (20)	E (18)	E (18)	O (20)	8.18	8.29	8.23	0.00	P
18601914076	SUBHAJIT DEY	C (24)	A (32)	C (24)	B (28)	C (24)	E (18)	E (18)	E (18)	A (16)	6.48	7.21	6.82	0.00	XP
18601914077	SUBHAJIT KARAK	D (20)	C (24)	D (20)	F (8)	C (24)	A (16)	B (14)	A (16)	B (14)	6.09	5.57	5.85	0.00	XP
18601914078	SUCHARITA CHOUDHURY	C (24)	C (24)	F (8)	D (20)	D (20)	E (18)	E (18)	E (18)	A (16)	6.21	5.93	6.08	0.00	XP
18601914079	SUMANA DAS	D (20)	B (28)	F (8)	D (20)	D (20)	E (18)	A (16)	B (14)	A (16)	5.70	5.71	5.70	0.00	XP
18601914080	SUMEL ASHIQUE	A (32)	E (36)	B (28)	C (24)	A (32)	E (18)	E (18)	E (18)	E (18)	7.70	8.00	7.84	0.00	XP
18601914081	SUMIT SAHA	B (28)	B (28)	C (24)	B (28)	A (32)	A (16)	E (18)	E (18)	E (18)	7.79	7.50	7.66	0.00	P
18601914082	SUPRATIM DAS	B (28)	E (36)	B (28)	E (36)	A (32)	E (18)	O (20)	E (18)	O (20)	7.79	8.43	8.08	0.00	P
18601914083	SUSMITA KAR	B (28)	E (36)	B (28)	A (32)	A (32)	E (18)	E (18)	E (18)	E (18)	7.94	8.14	8.03	0.00	XP
18601914084	SUSMITA ROY	B (28)	A (32)	B (28)	B (28)	B (28)	A (16)	E (18)	E (18)	E (18)	6.94	7.64	7.26	0.00	P

18601914085	SUSMITA ROY	A (32)	E (36)	A (32)	E (36)	E (36)	E (18)	O (20)	E (18)	E (18)	7.76	8.79	8.23	0.00	P
18601914086	SUTIRTHA DAS	B (28)	A (32)	B (28)	E (36)	C (24)	E (18)	A (16)	E (18)	E (18)	7.39	7.79	7.57	0.00	XP
18601914087	SUVAJIT SANTRA	D (20)	D (20)	D (20)	D (20)	D (20)	A (16)	B (14)	B (14)	B (14)	4.58	5.64	5.07	0.00	XP
18601914088	SWAGATA BAKSHI	B (28)	A (32)	A (32)	E (36)	A (32)	E (18)	O (20)	E (18)	A (16)	7.70	8.29	7.97	0.00	P
18601914089	SWAGATA PAL	C (24)	A (32)	C (24)	B (28)	A (32)	E (18)	E (18)	A (16)	A (16)	7.27	7.43	7.34	0.00	XP
18601914090	SWARAJIT BARIK	C (24)	D (20)	F (8)	F (8)	D (20)	A (16)	A (16)	I (4)	B (14)	4.27	4.64	4.44	0.00	XP
18601914091	SWEETY PRASHANT	A (32)	E (36)	C (24)	E (36)	E (36)	E (18)	E (18)	E (18)	O (20)	8.09	8.50	8.28	0.00	P
18601914092	TANDRIMA CHATTERJEE	E (36)	E (36)	A (32)	O (40)	O (40)	E (18)	O (20)	E (18)	O (20)	9.06	9.29	9.16	0.00	P
18601914093	TANIA KHATOON	A (32)	A (32)	B (28)	E (36)	A (32)	E (18)	E (18)	A (16)	A (16)	7.18	8.14	7.62	0.00	P
18601914094	TANMOY KUMAR SAHA	C (24)	B (28)	F (8)	A (32)	F (8)	A (16)	A (16)	A (16)	A (16)	6.03	5.86	5.95	0.00	XP
18601914095	TANMOY MAJI	A (32)	I (8)	B (28)	B (28)	A (32)	A (16)	E (18)	E (18)	O (20)	7.06	7.14	7.10	0.00	XP
18601914096	TANUSHREE CHATTERJEE	A (32)	B (28)	D (20)	B (28)	E (36)	E (18)	E (18)	E (18)	E (18)	6.94	7.71	7.30	0.00	XP
18601914097	TRISHA DEY DHARA	A (32)	E (36)	B (28)	O (40)	A (32)	E (18)	O (20)	E (18)	E (18)	8.06	8.64	8.33	0.00	P
18601914098	TRISHA SEN	D (20)	D (20)	D (20)	B (28)	C (24)	E (18)	E (18)	E (18)	E (18)	7.15	6.57	6.89	0.00	XP
18601914099	TUHIN GHOSH	D (20)	D (20)	D (20)	D (20)	F (8)	A (16)	A (16)	B (14)	B (14)	6.00	5.29	5.67	0.00	XP
18601914100	UTTIYA DATTA	A (32)	E (36)	B (28)	E (36)	E (36)	E (18)	E (18)	E (18)	E (18)	7.79	8.57	8.15	0.00	P
18601915122	AVA RANI SINHA	A (32)	A (32)	B (28)	E (36)	A (32)	E (18)	O (20)	E (18)	O (20)	7.94	8.43	8.16	0.00	P
18601915123	AVINASH KUMAR	B (28)	B (28)	D (20)	A (32)	B (28)	A (16)	E (18)	E (18)	E (18)	6.00	7.36	6.62	0.00	XP
18601915124	KABIR HOSSAIN MALLICK	A (32)	A (32)	C (24)	E (36)	B (28)	E (18)	E (18)	A (16)	E (18)	7.03	7.93	7.44	0.00	P
1860191	KOUSHIK	E (	A (	B (	E (	A (	E (	O (	E (	E (	7.70	8.50	8.07	0.00	P

ID	Name	1	2	3	4	5	6	7	8					
5125	DUTTA	36)	32)	28)	36)	32)	18)	20)	18)	18)					
1860191 5126	MD ASIF	B (28)	B (28)	C (24)	A (32)	C (24)	A (16)	A (16)	A (16)	B (14)	5.55	7.07	6.25	0.00	XP
1860191 5127	MONIKARN A DATTA	B (28)	A (32)	C (24)	A (32)	D (20)	E (18)	O (20)	A (16)	E (18)	6.06	7.43	6.69	0.00	XP
1860191 5128	NASIMA AKTAR	C (24)	B (28)	C (24)	A (32)	D (20)	A (16)	A (16)	B (14)	B (14)	4.94	6.71	5.75	0.00	XP
1860191 5129	NISHANT KUMAR	B (28)	C (24)	D (20)	A (32)	C (24)	A (16)	A (16)	A (16)	A (16)	5.58	6.86	6.16	0.00	XP
1860191 5130	PARTHA SARKAR	A (32)	A (32)	B (28)	B (28)	A (32)	E (18)	A (16)	E (18)	E (18)	7.18	7.93	7.52	0.00	P
1860191 5131	POONAM BIKASH BISWAS	A (32)	B (28)	B (28)	B (28)	B (28)	E (18)	E (18)	A (16)	A (16)	6.67	7.57	7.08	0.00	P
1860191 5132	PRATAP CHATTOPAD HYAY	C (24)	B (28)	D (20)	C (24)	D (20)	E (18)	E (18)	E (18)	I (4)	6.09	6.21	6.15	0.00	XP
1860191 5133	RAJU DEBNATH	B (28)	B (28)	C (24)	C (24)	C (24)	A (16)	A (16)	A (16)	A (16)	5.73	6.86	6.25	0.00	XP
1860191 5134	SABIR KHAN	B (28)	B (28)	D (20)	C (24)	C (24)	A (16)	E (18)	A (16)	E (18)	6.52	6.86	6.67	0.00	P
1860191 5135	SHREYA BANIK	C (24)	C (24)	D (20)	D (20)	D (20)	A (16)	B (14)	B (14)	A (16)	5.18	6.00	5.56	0.00	XP
1860191 5136	SOMA GHOSH	A (32)	A (32)	C (24)	C (24)	B (28)	E (18)	A (16)	E (18)	E (18)	6.09	7.50	6.74	0.00	XP
1860191 5137	SRIJON MAJUMDER	D (20)	C (24)	C (24)	C (24)	D (20)	A (16)	A (16)	A (16)	E (18)	5.45	6.36	5.87	0.00	XP
1860191 5138	SUBHASISH SINHA	B (28)	B (28)	C (24)	B (28)	C (24)	A (16)	E (18)	B (14)	A (16)	5.58	7.00	6.23	0.00	XP
1860191 5139	SUBHRAJIT MAJUMDER	A (32)	A (32)	C (24)	B (28)	C (24)	E (18)	A (16)	E (18)	E (18)	6.52	7.50	6.97	0.00	P
1860191 5140	SWEETY GUPTA	B (28)	E (36)	C (24)	A (32)	B (28)	O (20)	O (20)	E (18)	O (20)	7.12	8.07	7.56	0.00	P

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(formerly known as West Bengal University of Technology)

RESULT 2015-2016

College Name : **GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY**

For the THIRD YEAR SECOND SEMESTER EXAMINATION OF 2015-2016

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT 603	PT 606	PT 611	PT 608	PT 609	PT6 10A/ PT6 10B	PT 693	PT 696	PT 697	PT 698	PT6 91A/ PT6 91B	PT 682	SG PA 5	SG PA 6	YG PA	DG PA	RES ULT
186019 12077	RUDRA NARAYAN HUI	C (24)	D (15)	F (8)	B (21)	C (18)	D (15)	C (12)	A (16)	A (16)	A (16)	B (21)	A (16)	5.14	6.00	5.6 1	0.0 0	XP
186019 13001	AAMAN ROY	B (28)	C (18)	C (24)	C (18)	D (15)	D (15)	C (12)	B (14)	A (16)	A (16)	B (21)	A (16)	4.64	6.45	5.6 2	0.0 0	XP
186019 13002	ABANTIK A GHOSH	A (32)	B (21)	B (28)	B (21)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	E (27)	A (16)	6.71	7.94	7.3 8	0.0 0	P
186019 13003	ABHIRAJ PATHAK	A (32)	A (24)	B (28)	C (18)	B (21)	B (21)	A (16)	E (18)	E (18)	A (16)	E (27)	E (18)	7.21	7.79	7.5 2	0.0 0	P
186019 13004	ABHIRUP DEY	B (28)	A (24)	C (24)	C (18)	C (18)	B (21)	A (16)	E (18)	E (18)	A (16)	E (27)	O (20)	6.18	7.52	6.9 0	0.0 0	XP
186019 13005	ABHIRUP SAHA	B (28)	A (24)	B (28)	B (21)	A (24)	B (21)	E (18)	E (18)	E (18)	A (16)	E (27)	A (16)	7.07	7.85	7.4 9	0.0 0	P

Reg No	Name																		Result
186019 13006	ABHISHEK GUPTA	A (32)	A (24)	E (36)	E (27)	A (24)	E (27)	E (18)	E (18)	E (18)	A (16)	E (27)	O (20)	8.21	8.70	8.48	0.00	P
186019 13007	AINDRILA BHOWMICK	A (32)	E (27)	A (32)	B (21)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	E (27)	O (20)	7.86	8.36	8.13	0.00	P
186019 13008	AISHWARYA DATTA	A (32)	A (24)	B (28)	B (21)	B (21)	B (21)	E (18)	E (18)	E (18)	E (18)	E (27)	O (20)	7.54	8.06	7.82	0.00	P
186019 13009	ANIRBAN CHAKRABORTY	C (24)	C (18)	C (24)	C (18)	D (15)	B (21)	C (12)	A (16)	C (12)	A (16)	C (18)	A (16)	4.82	6.36	5.66	0.00	XP
186019 13010	ANIRBAN GHOSH	B (28)	D (15)	D (20)	D (15)	C (18)	B (21)	C (12)	C (12)	B (14)	B (14)	C (18)	A (16)	5.11	6.15	5.67	0.00	XP
186019 13011	ANIRUDDHA BHAR	B (28)	C (18)	B (28)	B (21)	B (21)	B (21)	E (18)	A (16)	A (16)	A (16)	E (27)	A (16)	5.61	7.45	6.61	0.00	XP
186019 13012	ANISH KUMAR PALIT	E (36)	B (21)	A (32)	B (21)	E (27)	C (18)	A (16)	A (16)	A (16)	A (16)	E (27)	A (16)	7.11	7.94	7.56	0.00	P
186019 13013	ANJALI MONDAL	E (36)	E (27)	E (36)	E (27)	E (27)	E (27)	O (20)	O (20)	O (20)	O (20)	O (30)	O (20)	8.86	9.39	9.15	0.00	P
186019 13014	ANKITA ACHARYA	B (28)	B (21)	A (32)	B (21)	B (21)	B (21)	A (16)	E (18)	E (18)	E (18)	E (27)	O (20)	7.00	7.91	7.49	0.00	P
186019 13015	ANURAG T K BAIDYA	B (28)	B (21)	B (28)	A (24)	B (21)	B (21)	A (16)	E (18)	E (18)	E (18)	E (27)	O (20)	7.25	7.88	7.59	0.00	P
186019 13016	APARUPA SINHA	B (28)	A (24)	A (32)	B (21)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	E (27)	O (20)	6.25	8.15	7.28	0.00	XP
186019 13017	ARGHYA ROY	A (32)	A (24)	B (28)	A (24)	A (24)	B (21)	A (16)	E (18)	E (18)	A (16)	E (27)	E (18)	7.71	8.06	7.90	0.00	P
186019 13018	ARIJIT MITRA THAKUR	B (28)	B (21)	B (28)	B (21)	B (21)	B (21)	A (16)	E (18)	E (18)	A (16)	E (27)	A (16)	7.07	7.61	7.36	0.00	P
186019 13019	ARIJIT PRAMANIK	A (32)	B (21)	A (32)	B (21)	B (21)	B (21)	E (18)	E (18)	O (20)	E (18)	E (27)	O (20)	8.04	8.15	8.10	0.00	P
186019 13020	ARINDAM CHATTERJ	B (28)	B (21)	C (24)	C (18)	B (21)	B (21)	A (16)	E (18)	E (18)	E (18)	E (27)	E (18)	7.29	7.52	7.41	0.00	P

	EE																	
		)	)	)	)	)		)	)	)	)		)					
186019 13021	ARITRA GHOSH	B (28)	B (21)	C (24)	B (21)	B (21)	C (18)	A (16)	E (18)	E (18)	A (16)	A (24)	E (18)	6.54	7.36	6.98	0.00	XP
186019 13022	ARUNAVA CHAKRAB ORTY	A (32)	A (24)	B (28)	A (24)	A (24)	B (21)	A (16)	E (18)	E (18)	E (18)	E (27)	O (20)	7.54	8.18	7.89	0.00	P
186019 13023	ASWIN PATEL	E (36)	A (24)	E (36)	B (21)	A (24)	C (18)	A (16)	E (18)	E (18)	E (18)	E (27)	A (16)	7.25	8.24	7.79	0.00	P
186019 13024	ATAUR RAHAMA N LASKAR	B (28)	B (21)	B (28)	C (18)	B (21)	C (18)	A (16)	E (18)	E (18)	A (16)	E (27)	O (20)	6.96	7.55	7.28	0.00	P
186019 13026	BANTI SINGH	A (32)	E (27)	A (32)	E (27)	E (27)	E (27)	E (18)	E (18)	E (18)	E (18)	E (27)	O (20)	8.07	8.82	8.48	0.00	P
186019 13027	CHAYAN GUIN	C (24)	A (24)	C (24)	C (18)	C (18)	C (18)	B (14)	E (18)	E (18)	E (18)	E (27)	A (16)	6.71	7.18	6.97	0.00	XP
186019 13028	DEBARAT I BHATTAC HARYA	O (40)	E (27)	E (36)	E (27)	A (24)	A (24)	O (20)	O (20)	E (18)	O (20)	E (27)	O (20)	8.61	9.18	8.92	0.00	P
186019 13029	DEBJANI SAHA	B (28)	E (27)	B (28)	E (27)	A (24)	A (24)	A (16)	E (18)	E (18)	O (20)	A (24)	O (20)	8.04	8.30	8.18	0.00	P
186019 13030	DEBOLIN A MANNA	A (32)	E (27)	E (36)	O (30)	A (24)	E (27)	O (20)	E (18)	O (20)	O (20)	E (27)	O (20)	8.39	9.12	8.79	0.00	P
186019 13032	DIBYOJYO TI CHATTERJ EE	B (28)	A (24)	E (36)	A (24)	A (24)	E (27)	E (18)	O (20)	E (18)	E (18)	O (30)	O (20)	8.32	8.70	8.52	0.00	P
186019 13033	DIPANJAN GHOSH	B (28)	A (24)	A (32)	A (24)	B (21)	B (21)	E (18)	E (18)	E (18)	O (20)	E (27)	O (20)	8.07	8.21	8.15	0.00	P
186019 13034	DIPANKA R KAMILA	C (24)	B (21)	B (28)	B (21)	C (18)	C (18)	A (16)	E (18)	E (18)	A (16)	E (27)	A (16)	6.50	7.30	6.93	0.00	P
186019 13035	DIPTARCO SINGHA	C (24)	A (24)	B (28)	A (24)	B (21)	A (24)	E (18)	E (18)	O (20)	E (18)	E (27)	O (20)	7.21	8.06	7.67	0.00	P
186019 13036	DURJOY GHOSH	A (32)	A (24)	A (32)	O (30)	A (24)	O (30)	O (20)	O (20)	O (20)	E (18)	E (27)	O (20)	8.29	9.00	8.67	0.00	P

Roll	Name																	
		)	)	)	)	)		)	)	)	)		)					
186019 13037	HRISHAV ROYCHO WDHURY	E(36)	E(27)	A(32)	E(27)	A(24)	E(27)	E(18)	O(20)	E(18)	E(18)	O(30)	O(20)	8.57	9.00	8.80	0.00	P
186019 13038	INDRANIL MUKHERJ EE	C(24)	B(21)	C(24)	A(24)	A(24)	A(24)	E(18)	E(18)	E(18)	A(16)	E(27)	O(20)	7.82	7.82	7.82	0.00	P
186019 13039	IPSITA GAYEN	A(32)	E(27)	A(32)	E(27)	A(24)	A(24)	O(20)	O(20)	O(20)	E(18)	O(30)	O(20)	8.39	8.91	8.67	0.00	P
186019 13040	JOYATI GHOSH	A(32)	B(21)	B(28)	A(24)	B(21)	B(21)	A(16)	O(20)	E(18)	E(18)	E(27)	O(20)	7.18	8.06	7.66	0.00	P
186019 13041	KABERI CHATTERJ EE	B(28)	B(21)	E(36)	E(27)	E(27)	E(27)	E(18)	O(20)	O(20)	O(20)	O(30)	O(20)	8.61	8.91	8.77	0.00	P
186019 13042	KHADEM UL ISLAM	D(20)	C(18)	C(24)	C(18)	C(18)	B(21)	A(16)	E(18)	A(16)	A(16)	A(24)	O(20)	7.14	6.94	7.03	0.00	XP
186019 13043	KUNTAL NANDY	C(24)	C(18)	C(24)	A(24)	B(21)	A(24)	A(16)	E(18)	E(18)	A(16)	E(27)	O(20)	7.57	7.58	7.57	0.00	P
186019 13044	MANDIRA GHORAI	A(32)	E(27)	A(32)	E(27)	O(30)	E(27)	E(18)	O(20)	O(20)	E(18)	E(27)	O(20)	8.61	9.03	8.84	0.00	P
186019 13045	MANPREE T GHAI	C(24)	C(18)	B(28)	A(24)	B(21)	E(27)	E(18)	E(18)	O(20)	E(18)	E(27)	O(20)	7.82	7.97	7.90	0.00	P
186019 13046	MD NAZMUL AHAMED MALLICK	C(24)	C(18)	B(28)	B(21)	B(21)	B(21)	E(18)	E(18)	E(18)	A(16)	E(27)	O(20)	7.21	7.58	7.41	0.00	P
186019 13047	MOZAMM EL HAQUE	D(20)	B(21)	B(28)	B(21)	A(24)	E(27)	E(18)	E(18)	E(18)	E(18)	E(27)	O(20)	7.89	7.88	7.89	0.00	P
186019 13048	NAYAN KARMAK AR	B(28)	C(18)	D(20)	B(21)	B(21)	B(21)	E(18)	E(18)	A(16)	A(16)	A(24)	E(18)	6.39	7.24	6.85	0.00	XP
186019 13049	NILANJAN SAHA	C(24)	B(21)	C(24)	B(21)	A(24)	A(24)	A(16)	E(18)	E(18)	A(16)	E(27)	E(18)	7.32	7.61	7.48	0.00	P
186019 13051	OLIVA JANA	D(20)	B(21)	C(24)	A(24)	E(27)	A(24)	E(18)	E(18)	E(18)	A(16)	E(27)	E(18)	8.61	7.73	8.13	0.00	P

186019 13052	PALLABI SARKAR	A (32)	A (24)	A (32)	E (27)	E (27)	E (27)	E (18)	O (20)	E (18)	O (20)	O (30)	O (20)	8.71	8.94	8.84	0.00	P
186019 13053	PAMOLITA PAUL	B (28)	B (21)	B (28)	A (24)	E (27)	A (24)	A (16)	E (18)	E (18)	E (18)	E (27)	O (20)	8.64	8.15	8.38	0.00	P
186019 13054	POULAMI SARKAR	B (28)	A (24)	B (28)	E (27)	A (24)	A (24)	E (18)	O (20)	O (20)	O (20)	O (30)	O (20)	8.86	8.58	8.70	0.00	P
186019 13055	PRITI KUNDU	C (24)	B (21)	B (28)	E (27)	B (21)	A (24)	E (18)	O (20)	O (20)	O (20)	E (27)	O (20)	8.79	8.18	8.46	0.00	P
186019 13056	PRIYA BARDHAN RAY	C (24)	B (21)	C (24)	A (24)	A (24)	B (21)	E (18)	O (20)	E (18)	E (18)	O (30)	O (20)	8.68	7.94	8.28	0.00	P
186019 13057	PRIYA DEY	B (28)	C (18)	C (24)	B (21)	C (18)	B (21)	A (16)	E (18)	E (18)	A (16)	E (27)	E (18)	7.43	7.36	7.39	0.00	P
186019 13059	RAJDEEP SAHA	C (24)	A (24)	A (32)	E (27)	E (27)	E (27)	O (20)	O (20)	O (20)	O (20)	O (30)	O (20)	9.25	8.82	9.02	0.00	P
186019 13060	RANIT PAUL	F (8)	C (18)	D (20)	D (15)	F (6)	B (21)	A (16)	E (18)	E (18)	E (18)	B (21)	O (20)	7.57	6.03	6.74	0.00	XP
186019 13061	RATUL BANDURI	C (24)	C (18)	D (20)	C (18)	B (21)	C (18)	A (16)	E (18)	A (16)	A (16)	A (24)	E (18)	7.00	6.88	6.93	0.00	XP
186019 13062	RINKEE GHOSH	C (24)	B (21)	D (20)	A (24)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	E (27)	O (20)	7.57	7.67	7.62	0.00	P
186019 13063	RITAM BAIRAGI	D (20)	B (21)	C (24)	B (21)	A (24)	D (15)	A (16)	E (18)	A (16)	E (18)	E (27)	E (18)	7.50	7.21	7.34	0.00	XP
186019 13064	RITAM CHOUDHURY	B (28)	A (24)	E (36)	A (24)	A (24)	A (24)	E (18)	O (20)	O (20)	E (18)	E (27)	O (20)	8.39	8.58	8.49	0.00	P
186019 13065	RUDRADIP DAS	A (32)	A (24)	O (40)	E (27)	E (27)	A (24)	O (20)	O (20)	O (20)	O (20)	E (27)	O (20)	9.29	9.12	9.20	0.00	P
186019 13066	SAMHITA KUMAR	C (24)	C (18)	A (32)	A (24)	A (24)	B (21)	E (18)	E (18)	E (18)	O (20)	E (27)	E (18)	8.00	7.94	7.97	0.00	P
186019 13067	SAMPITA PAL	A (32)	A (24)	O (40)	E (27)	E (27)	E (27)	O (20)	O (20)	O (20)	O (20)	O (30)	O (20)	8.96	9.30	9.15	0.00	P

		)	)	)	)	)		)	)	)	)		)					
186019 13068	SATABDI BASAK	F (8)	C (18)	C (24)	C (18)	C (18)	C (18)	A (16)	E (18)	E (18)	A (16)	E (27)	A (16)	6.89	6.52	6.69	0.00	XP
186019 13069	SAURAV CHAKRAB ORTY	F (8)	B (21)	B (28)	A (24)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	E (27)	E (18)	7.71	7.36	7.52	0.00	XP
186019 13070	SAYAN DAS	C (24)	A (24)	A (32)	B (21)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	A (24)	E (18)	7.79	7.88	7.84	0.00	P
186019 13071	SAYAN SAHA	F (8)	C (18)	C (24)	D (15)	D (15)	C (18)	E (18)	E (18)	E (18)	E (18)	E (27)	A (16)	6.93	6.45	6.67	0.00	XP
186019 13073	SAYANI BANERJEE	D (20)	B (21)	A (32)	C (18)	A (24)	C (18)	E (18)	O (20)	E (18)	A (16)	E (27)	E (18)	7.32	7.58	7.46	0.00	P
186019 13074	SAYANTA N DATTA	F (8)	A (24)	B (28)	B (21)	C (18)	B (21)	E (18)	E (18)	E (18)	E (18)	A (24)	E (18)	6.68	7.09	6.90	0.00	XP
186019 13075	SHAHJAM AN HALDER	D (20)	B (21)	A (32)	C (18)	C (18)	C (18)	E (18)	E (18)	E (18)	A (16)	E (27)	E (18)	7.18	7.33	7.26	0.00	P
186019 13076	SHANTAN EEL INDU	D (20)	A (24)	B (28)	A (24)	E (27)	A (24)	E (18)	E (18)	E (18)	E (18)	E (27)	O (20)	7.79	8.06	7.93	0.00	P
186019 13077	SHARMIS THA DAS	D (20)	E (27)	C (24)	A (24)	A (24)	A (24)	E (18)	E (18)	E (18)	E (18)	E (27)	A (16)	8.04	7.82	7.92	0.00	P
186019 13078	SHASHWA TA GHOSH	C (24)	A (24)	B (28)	E (27)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	O (30)	O (20)	8.43	8.18	8.30	0.00	P
186019 13079	SK ABDUL SALAM	B (28)	A (24)	O (40)	E (27)	A (24)	A (24)	E (18)	E (18)	E (18)	E (18)	E (27)	O (20)	8.32	8.67	8.51	0.00	P
186019 13080	SNEHAM SEN	B (28)	E (27)	E (36)	O (30)	A (24)	E (27)	E (18)	E (18)	E (18)	E (18)	E (27)	E (18)	8.04	8.76	8.43	0.00	P
186019 13081	SOHAM BHATTAC HARYA	F (8)	C (18)	B (28)	B (21)	B (21)	D (15)	B (14)	A (16)	A (16)	A (16)	A (24)	A (16)	5.32	6.45	5.93	0.00	XP
186019 13082	SOHAM CHATTERJ EE	E (36)	E (27)	O (40)	O (30)	A (24)	A (24)	E (18)	O (20)	E (18)	O (20)	E (27)	O (20)	8.86	9.21	9.05	0.00	P
186019	SOUMAV	E (	A (	E (	E (	B (	B (	E (	E (	E (	E (	E (	O (	7.79	8.61	8.2	0.0	XP

13083	A BHATTACHARYA	36)	24)	36)	27)	21)	21)	18)	18)	18)	18)	27)	20)			3	0	
186019 13084	SOUMENDU MONDAL	D(20)	A(24)	A(32)	A(24)	A(24)	B(21)	A(16)	A(16)	A(16)	A(16)	A(24)	A(16)	7.00	7.55	7.30	0.00	P
186019 13085	SOUMIK DEY	B(28)	A(24)	E(36)	E(27)	A(24)	A(24)	E(18)	O(20)	E(18)	E(18)	A(24)	O(20)	7.89	8.52	8.23	0.00	P
186019 13086	SOUMYA DAS	D(20)	C(18)	B(28)	C(18)	D(15)	D(15)	B(14)	A(16)	A(16)	A(16)	A(24)	A(16)	6.43	6.55	6.49	0.00	XP
186019 13087	SOUMYA DEEP BHATTACHARYA	D(20)	A(24)	A(32)	B(21)	A(24)	C(18)	E(18)	E(18)	E(18)	E(18)	E(27)	E(18)	7.25	7.76	7.52	0.00	P
186019 13088	SOUMYAJIT ROY	D(20)	A(24)	A(32)	B(21)	A(24)	B(21)	E(18)	E(18)	E(18)	A(16)	E(27)	E(18)	7.04	7.79	7.44	0.00	P
186019 13089	SOUMYAJIT SINHA	F(8)	B(21)	B(28)	B(21)	C(18)	C(18)	A(16)	E(18)	E(18)	A(16)	E(27)	E(18)	6.86	6.88	6.87	0.00	XP
186019 13090	SUBHADIP CHAKRABORTY	D(20)	B(21)	C(24)	C(18)	B(21)	C(18)	A(16)	E(18)	E(18)	E(18)	A(24)	A(16)	7.43	7.03	7.21	0.00	XP
186019 13091	SUBHAJIT MANNA	C(24)	A(24)	B(28)	A(24)	B(21)	A(24)	A(16)	E(18)	E(18)	E(18)	E(27)	E(18)	7.89	7.88	7.89	0.00	P
186019 13092	SUDEEPA PAUL	F(8)	C(18)	C(24)	C(18)	A(24)	B(21)	A(16)	E(18)	E(18)	A(16)	A(24)	E(18)	6.21	6.76	6.51	0.00	XP
186019 13093	SUDIPTA MANNA	B(28)	C(18)	C(24)	B(21)	C(18)	A(24)	A(16)	E(18)	A(16)	A(16)	E(27)	E(18)	6.86	7.39	7.15	0.00	P
186019 13094	SUNANADA DEY	B(28)	E(27)	E(36)	E(27)	A(24)	E(27)	E(18)	O(20)	O(20)	O(20)	O(30)	O(20)	8.61	9.00	8.82	0.00	P
186019 13095	SUSMITA KOLEY	D(20)	D(15)	B(28)	A(24)	C(18)	D(15)	A(16)	E(18)	E(18)	A(16)	F(6)	A(16)	5.96	6.36	6.18	0.00	XP
186019 13096	SWATI ABAT	C(24)	E(27)	A(32)	E(27)	A(24)	B(21)	E(18)	O(20)	E(18)	E(18)	E(27)	O(20)	8.46	8.36	8.41	0.00	P
186019	TANAYA	D(	C(	A(	C(	C(	D(	A(	E(	A(	A(	E(	A(	6.50	6.97	6.7	0.0	XP

13097	PALIT	20)	18)	32)	18)	18)	15)	16)	18)	16)	16)	27)	16)			5	0	
186019 13099	TANMAY SAHA	O (40)	O (30)	O (40)	O (30)	E (27)	E (27)	O (20)	O (20)	O (20)	O (20)	O (30)	O (20)	9.54	9.82	9.6 9	0.0 0	P
186019 13100	TANUMO Y GHOSH	D (20)	A (24)	B (28)	A (24)	A (24)	C (18)	A (16)	E (18)	A (16)	A (16)	A (24)	A (16)	7.46	7.39	7.4 3	0.0 0	P
186019 13101	TOUMICA GHOSH	D (20)	E (27)	C (24)	A (24)	A (24)	A (24)	E (18)	E (18)	E (18)	A (16)	A (24)	E (18)	8.21	7.73	7.9 5	0.0 0	P
186019 14101	ARGHADE EP DEY	C (24)	B (21)	A (32)	A (24)	B (21)	A (24)	A (16)	E (18)	E (18)	E (18)	A (24)	E (18)	7.57	7.82	7.7 0	0.0 0	P
186019 14102	ARPITA GHOSAL	A (32)	E (27)	O (40)	O (30)	E (27)	A (24)	O (20)	O (20)	O (20)	O (20)	O (30)	O (20)	9.00	9.39	9.2 1	0.0 0	P
186019 14103	AVIRUP DAS	D (20)	B (21)	B (28)	A (24)	A (24)	B (21)	B (14)	A (16)	A (16)	A (16)	A (24)	E (18)	7.11	7.33	7.2 3	0.0 0	P
186019 14104	DEBABRA TA JANA	F (8)	A (24)	C (24)	B (21)	B (21)	B (21)	A (16)	A (16)	A (16)	A (16)	A (24)	A (16)	7.11	6.76	6.9 2	0.0 0	XP
186019 14105	DIPTARUP JANA	C (24)	B (21)	C (24)	A (24)	B (21)	B (21)	A (16)	E (18)	A (16)	E (18)	A (24)	A (16)	7.68	7.36	7.5 1	0.0 0	XP
186019 14106	LABANI SARKAR	C (24)	A (24)	C (24)	C (18)	B (21)	A (24)	A (16)	E (18)	E (18)	E (18)	E (27)	E (18)	7.79	7.58	7.6 7	0.0 0	P
186019 14107	NILANJAN PARIA	F (8)	C (18)	C (24)	C (18)	C (18)	C (18)	B (14)	A (16)	A (16)	A (16)	B (21)	A (16)	6.82	6.15	6.4 6	0.0 0	XP
186019 14108	ONKAR CHATTERJ EE	C (24)	A (24)	D (20)	B (21)	B (21)	B (21)	A (16)	O (20)	E (18)	E (18)	E (27)	E (18)	7.43	7.52	7.4 8	0.0 0	P
186019 14109	PAROMIT A DAS	A (32)	A (24)	C (24)	B (21)	A (24)	B (21)	E (18)	E (18)	E (18)	E (18)	E (27)	O (20)	8.07	8.03	8.0 5	0.0 0	P
186019 14110	PAYEL BHATTAC HARJEE	B (28)	E (27)	B (28)	A (24)	A (24)	A (24)	O (20)	O (20)	O (20)	E (18)	O (30)	O (20)	8.64	8.58	8.6 1	0.0 0	P
186019 14111	RUCHI BHATTAC HARYA	B (28)	A (24)	C (24)	B (21)	A (24)	A (24)	O (20)	O (20)	E (18)	E (18)	O (30)	O (20)	8.64	8.21	8.4 1	0.0 0	P

18601914112	SAYANI BANERJEE	D (20)	A (24)	C (24)	E (27)	A (24)	A (24)	E (18)	E (18)	E (18)	E (18)	O (30)	O (20)	8.46	8.03	8.23	0.00	P
18601914113	SUBHANKAR GHOSH	F (8)	A (24)	D (20)	C (18)	B (21)	C (18)	B (14)	A (16)	B (14)	A (16)	A (24)	A (16)	6.21	6.33	6.28	0.00	XP

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(formerly known as West Bengal University of Technology)

RESULT 2015-2016

College Name : **GURUNANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY**

For the **FOURTH YEAR SECOND SEMESTER EXAMINATION OF 2015-2016**

Degree : Bpharm Pharmacy

ROLL NO.	NAME	PT812	PT813	PT818	PT801	PT891	PT884	SGPA7	SGPA8	YGPA	DGPA	RESULT
18601912 001	ABHINANDAN MONDAL	B (21)	B (21)	D (15)	B (21)	A (16)	A (48)	7.00	7.10	7.04		X
18601912 002	AHELI MUKHERJEE	A (24)	A (24)	B (21)	B (21)	O (20)	O (60)	9.15	8.50	8.87	8.79	P
18601912 003	AIESHI BHOWMICK	A (24)	A (24)	C (18)	B (21)	E (18)	O (60)	8.56	8.25	8.43	8.17	P
18601912 004	AISHIKA DATTA	A (24)	E (27)	A (24)	E (27)	O (20)	O (60)	9.44	9.10	9.30	9.3	P
18601912 005	ANGANA NASKAR	A (24)	A (24)	B (21)	A (24)	E (18)	E (54)	7.44	8.25	7.79	7.57	P
18601912 006	ANIRBAN ROY	O (30)	A (24)	A (24)	B (21)	O (20)	O (60)	9.04	8.95	9.00	8.88	P
18601912 007	ANKUR MONDAL	E (27)	A (24)	A (24)	B (21)	O (20)	O (60)	8.59	8.80	8.68	8.63	P
18601912 008	ANTARA ROY	A (24)	A (24)	C (18)	B (21)	A (16)	E (54)	7.00	7.85	7.36	7.22	P
18601912 009	ANURAG GHOSH	B (21)	A (24)	B (21)	C (18)	A (16)	A (48)	7.30	7.40	7.34	7.27	P
18601912 010	ARANI RAY	C (18)	B (21)	C (18)	C (18)	A (16)	A (48)	6.85	6.95	6.89		X

18601912011	ARIJIT MONDAL	A (24)	B (21)	C (18)	B (21)	B (14)	A (48)	6.93	7.30	7.09		X
18601912012	ARIJIT MUKHERJEE	B (21)	B (21)	C (18)	C (18)	E (18)	E (54)	7.33	7.50	7.40		X
18601912013	ARINDAM MALLICK	C (18)	B (21)	C (18)	C (18)	E (18)	A (48)	6.70	7.05	6.85		X
18601912014	ARITRA MAITRA	C (18)	B (21)	C (18)	C (18)	A (16)	A (48)	6.78	6.95	6.85	6.68	P
18601912015	ARKA BAKSHI	B (21)	A (24)	B (21)	C (18)	A (16)	A (48)	7.30	7.40	7.34	6.72	P
18601912016	ARKA MUKHERJEE	E (27)	A (24)	B (21)	B (21)	E (18)	O (60)	7.56	8.55	7.98	7.39	P
18601912017	ARKO JYOTI HAZRA	B (21)	A (24)	C (18)	C (18)	A (16)	A (48)	7.33	7.25	7.30		X
18601912018	ARNAB BHUNIA	A (24)	B (21)	C (18)	C (18)	A (16)	E (54)	7.41	7.55	7.47		X
18601912019	ARNAB BISWAS	A (24)	B (21)	C (18)	C (18)	A (16)	A (48)	7.59	7.25	7.45		X
18601912020	ARNAB KANTI JANA	B (21)	A (24)	D (15)	B (21)	A (16)	A (48)	6.89	7.25	7.04		X
18601912021	ATANU MONDAL	C (18)	B (21)	C (18)	D (15)	A (16)	A (48)	7.11	6.80	6.98		X
18601912022	ATRI PAIN MAZUMDER	C (18)	B (21)	B (21)	C (18)	E (18)	E (54)	7.22	7.50	7.34		X
18601912023	AVIRUP DASGUPTA	A (24)	B (21)	C (18)	C (18)	E (18)	E (54)	7.70	7.65	7.68	7.17	P
18601912024	AVISHEK CHAKRABORTY	B (21)	B (21)	B (21)	C (18)	E (18)	E (54)	7.85	7.65	7.77	7.17	P
18601912025	BIMAN GUCHHAIT	B (21)	B (21)	C (18)	C (18)	E (18)	E (54)	7.63	7.50	7.57	7.31	P
18601912026	BITAN DAS	B (21)	B (21)	C (18)	C (18)	E (18)	E (54)	7.00	7.50	7.21	6.83	P
18601912027	BRATIN DAS	C (18)	C (18)	D (15)	D (15)	A (16)	E (54)	4.89	6.80	5.70		X
18601912028	CHANDRIKA SAHA	B (21)	B (21)	A (24)	A (24)	E (18)	O (60)	8.11	8.40	8.23	8.34	P
18601912029	DEBALINA DATTA	E (27)	A (24)	E (27)	A (24)	O (20)	O (60)	8.11	9.10	8.53	8.1	P
18601912030	DEBANJAN MITRA	C (18)	C (18)	C (18)	D (15)	B (14)	E (54)	6.52	6.85	6.66		X
18601912031	DEBANJANA DAS	B (21)	B (21)	B (21)	B (21)	O (20)	E (54)	8.07	7.90	8.00	8.36	P

18601912 032	DEBAYAN MISHRA	E (27)	A (24)	A (24)	C (18)	A (16)	E (54)	7.56	8.15	7.81	7.05	P
18601912 033	DEBLINA DE	A (24)	B (21)	B (21)	D (15)	E (18)	E (54)	7.59	7.65	7.62		X
18601912 034	DEBOLINA ROY	E (27)	B (21)	E (27)	E (27)	O (20)	O (60)	8.56	9.10	8.79	8.49	P
18601912 035	DEBSMITA SINGHA ROY	B (21)	B (21)	B (21)	C (18)	E (18)	O (60)	7.96	7.95	7.96	7.23	P
18601912 036	DIPAYAN NATH	E (27)	B (21)	B (21)	B (21)	E (18)	E (54)	8.22	8.10	8.17	7.54	P
18601912 037	EAKRSHI MALLICK	B (21)	B (21)	B (21)	C (18)	A (16)	E (54)	7.15	7.55	7.32		X
18601912 038	ENAKSHI GHOSH	B (21)	B (21)	B (21)	B (21)	E (18)	O (60)	8.59	8.10	8.38	8.25	P
18601912 039	EVANA PATRA	A (24)	B (21)	B (21)	A (24)	O (20)	O (60)	8.52	8.50	8.51	8.44	P
18601912 041	GOURAB DEY	A (24)	B (21)	B (21)	B (21)	A (16)	E (54)	7.33	7.85	7.55	7.48	P
18601912 042	HIMADRIJA CHATTERJEE	E (27)	A (24)	A (24)	E (27)	O (20)	O (60)	9.00	9.10	9.04	8.8	P
18601912 043	HIRANMOY GHOSH	A (24)	B (21)	C (18)	B (21)	A (16)	A (48)	7.74	7.40	7.60		X
18601912 044	INDIRA SAHA	A (24)	B (21)	B (21)	A (24)	E (18)	E (54)	7.74	8.10	7.89	7.35	P
18601912 045	INDRANIL PAUL	B (21)	B (21)	B (21)	B (21)	E (18)	E (54)	7.30	7.80	7.51	7.37	P
18601912 046	KAJAL	A (24)	A (24)	B (21)	A (24)	E (18)	E (54)	8.48	8.25	8.38	7.81	P
18601912 047	KAUSTAV MITRA	B (21)	B (21)	B (21)	B (21)	E (18)	O (60)	8.22	8.10	8.17		X
18601912 048	KRISHANU DUTTA	C (18)	B (21)	C (18)	B (21)	E (18)	E (54)	7.56	7.50	7.53		X
18601912 049	KRISHNAKALI BASU	B (21)	A (24)	B (21)	B (21)	E (18)	E (54)	7.59	7.95	7.74	7.56	P
18601912 050	KUNAL GHOSH	B (21)	B (21)	B (21)	C (18)	A (16)	E (54)	7.37	7.55	7.45		X
18601912 051	LOKNATH MAJI	A (24)	A (24)	A (24)	B (21)	A (16)	A (48)	7.63	7.85	7.72		X
18601912 052	MAINAK CHATTERJEE	E (27)	A (24)	A (24)	E (27)	O (20)	O (60)	9.26	9.10	9.19	9.04	P
18601912 053	MAITREYEE BANERJEE	A (24)	B (21)	B (21)	B (21)	A (16)	E (54)	8.26	7.85	8.09	7.67	P
18601912	MANISH	B (	C (	B (	C (	E (	E (	7.48	7.50	7.49	7.02	P

054	SANTRA	21)	18)	21)	18)	18)	54)				
18601912 055	MANOSHI GHOSH	B (21)	A (24)	B (21)	B (21)	E (18)	E (54)	8.11	7.95	8.04	7.24	P
18601912 056	MD NADEEM SHAH	D (15)	B (21)	D (15)	D (15)	A (16)	E (54)	6.37	6.80	6.55		X
18601912 057	NAMRATA GANGULY	A (24)	E (27)	A (24)	A (24)	O (20)	O (60)	8.89	8.95	8.91	8.64	P
18601912 059	NILOTPAL GORAI	A (24)	A (24)	C (18)	B (21)	E (18)	E (54)	7.93	7.95	7.94		X
18601912 060	PAMI SARKAR	A (24)	A (24)	B (21)	C (18)	E (18)	O (60)	6.96	8.25	7.51		X
18601912 061	PARAG ROY	A (24)	E (27)	A (24)	B (21)	E (18)	O (60)	9.07	8.70	8.91	8.71	P
18601912 062	PARTHA PRATIM KHATUA	B (21)	A (24)	A (24)	B (21)	A (16)	A (48)	8.30	7.70	8.04	8.04	P
18601912 063	PRIYADARSHINI DUTTA	B (21)	A (24)	B (21)	B (21)	E (18)	E (54)	7.74	7.95	7.83	7.12	P
18601912 064	PRIYANKA DE	E (27)	E (27)	E (27)	A (24)	O (20)	O (60)	9.33	9.25	9.30	9.23	P
18601912 065	PUJA ADHIKARY	E (27)	E (27)	A (24)	E (27)	O (20)	O (60)	9.04	9.25	9.13	8.81	P
18601912 066	RAJDEEP BANERJEE	B (21)	C (18)	B (21)	C (18)	A (16)	A (48)	6.81	7.10	6.94		X
18601912 067	RAJDEEP DEY	E (27)	E (27)	C (18)	A (24)	E (18)	O (60)	8.78	8.70	8.74	8.46	P
18601912 068	RAJIB SINGHAROY	A (24)	A (24)	C (18)	B (21)	A (16)	A (48)	7.74	7.55	7.66		X
18601912 069	RAJSEKHAR ROY	E (27)	A (24)	C (18)	B (21)	O (20)	O (60)	8.19	8.50	8.32	7.77	P
18601912 070	RAMITA BANERJEE	A (24)	A (24)	C (18)	C (18)	E (18)	O (60)	8.37	8.10	8.26	7.82	P
18601912 071	REEMI GUPTA	E (27)	E (27)	A (24)	A (24)	O (20)	E (54)	8.41	8.80	8.57	8.05	P
18601912 072	RINIK NANDY	A (24)	B (21)	C (18)	C (18)	E (18)	O (60)	7.26	7.95	7.55	7.44	P
18601912 073	RITIKA SINHA	E (27)	B (21)	B (21)	A (24)	E (18)	E (54)	8.41	8.25	8.34	7.85	P
18601912 074	RITUPARNA DAS	A (24)	B (21)	D (15)	B (21)	A (16)	A (48)	7.89	7.25	7.62		X
18601912 075	RIYA TARAN	B (21)	B (21)	C (18)	C (18)	A (16)	E (54)	7.78	7.40	7.62	7.33	P
18601912	ROUNAK DAS	B (	C (	D (	D (	A (	A (	6.89	6.65	6.79		X

076		21)	18)	15)	15)	16)	48)					
18601912 078	SAIKAT DAS	B (21)	B (21)	D (15)	B (21)	A (16)	A (48)	7.33	7.10	7.23	6.48	P
18601912 079	SAIKAT GHOSH	A (24)	C (18)	C (18)	B (21)	A (16)	E (54)	7.93	7.55	7.77		X
18601912 080	SAIPAYAN SAHA	A (24)	B (21)	B (21)	A (24)	E (18)	O (60)	7.96	8.40	8.15	7.42	P
18601912 081	SAKSHAR SAHA	E (27)	A (24)	C (18)	E (27)	O (20)	O (60)	9.15	8.80	9.00	9.05	P
18601912 082	SAKSHI JHA	A (24)	B (21)	C (18)	E (27)	O (20)	O (60)	8.89	8.50	8.72	8.5	P
18601912 084	SATADAL DEB ROY	C (18)	A (24)	B (21)	C (18)	E (18)	E (54)	8.04	7.65	7.87	7.38	P
18601912 085	SATHI PAUL	C (18)	B (21)	C (18)	B (21)	E (18)	E (54)	7.22	7.50	7.34	7.07	P
18601912 086	SAYANTAN GOSWAMI	A (24)	B (21)	B (21)	C (18)	A (16)	E (54)	7.78	7.70	7.74	7.36	P
18601912 087	SHILAJIT MONDAL	B (21)	A (24)	C (18)	B (21)	A (16)	A (48)	7.00	7.40	7.17		X
18601912 088	SHREYA SANYAL	E (27)	B (21)	B (21)	B (21)	A (16)	E (54)	8.63	8.00	8.36	8.35	P
18601912 089	SHREYASEE MITRA	A (24)	B (21)	D (15)	C (18)	A (16)	E (54)	7.74	7.40	7.60	7.38	P
18601912 090	SHRIYA RAY	A (24)	B (21)	C (18)	B (21)	O (20)	O (60)	7.78	8.20	7.96	7.48	P
18601912 091	SK SAJJAT ALI	C (18)	B (21)	D (15)	C (18)	A (16)	E (54)	7.52	7.10	7.34	7	P
18601912 092	SMARANJEET BANIK	B (21)	B (21)	C (18)	B (21)	E (18)	A (48)	8.00	7.35	7.72	6.98	P
18601912 093	SOUMYA BANERJEE	C (18)	B (21)	D (15)	D (15)	A (16)	A (48)	6.59	6.65	6.62		X
18601912 094	SOUMYA GUHA	C (18)	B (21)	C (18)	A (24)	E (18)	O (60)	8.37	7.95	8.19	8.57	P
18601912 095	SOUMYADRI CHAKRABORTY	C (18)	B (21)	C (18)	B (21)	O (20)	O (60)	8.56	7.90	8.28	8.07	P
18601912 096	SOURABH SAHA	A (24)	B (21)	C (18)	B (21)	E (18)	E (54)	8.22	7.80	8.04	7.74	P
18601912 097	SOURAV GUHA	C (18)	B (21)	D (15)	B (21)	A (16)	E (54)	7.52	7.25	7.40	6.82	P
18601912 098	SOURAV KUNDU	A (24)	C (18)	D (15)	C (18)	A (16)	E (54)	7.00	7.25	7.11	7.02	P
18601912	SOUVIK DAS	B (	C (	D (	B (	E (	E (	8.07	7.35	7.77	7.25	P

099		21)	18)	15)	21)	18)	54)				
18601912100	SUBARNA GANGULY	A (24)	C (18)	B (21)	B (21)	E (18)	O (60)	7.33	8.10	7.66	6.85	P
18601912101	SUBHADEEP DEY	E (27)	A (24)	B (21)	C (18)	E (18)	A (48)	7.30	7.80	7.51	7.2	P
18601912102	SUBHADEEP JANA	B (21)	B (21)	B (21)	C (18)	E (18)	A (48)	6.96	7.35	7.13	7.09	P
18601912103	SUBHADIP DAS	A (24)	B (21)	B (21)	C (18)	E (18)	E (54)	8.52	7.80	8.21	7.94	P
18601912104	SUBHADIP DEY	C (18)	B (21)	B (21)	F (6)	A (16)	A (48)	6.85	6.50	6.70		X
18601912105	SUBHAJIT SARKAR	B (21)	A (24)	B (21)	B (21)	E (18)	A (48)	7.00	7.65	7.28	6.84	P
18601912106	SUBHAM GHOSAL	B (21)	A (24)	B (21)	D (15)	O (20)	E (54)	7.85	7.75	7.81	7.84	P
18601912108	SUBHOJIT BARAL	C (18)	A (24)	B (21)	B (21)	E (18)	E (54)	7.93	7.80	7.87	7.88	P
18601912109	SUBHRAJIT GHOSH	D (15)	B (21)	D (15)	F (6)	A (16)	A (48)	6.96	6.05	6.57		X
18601912110	SUCHETANA DUTTA	B (21)	B (21)	B (21)	D (15)	E (18)	A (48)	8.26	7.20	7.81	7.65	P
18601912111	SUDIPTA RANI BERA	B (21)	B (21)	B (21)	D (15)	E (18)	A (48)	7.44	7.20	7.34	7.31	P
18601912112	SUDIPTO SARKAR	C (18)	A (24)	B (21)	A (24)	E (18)	A (48)	8.56	7.65	8.17	8.43	P
18601912113	SUJIT KUMAR CHAKRABORTY	C (18)	B (21)	C (18)	B (21)	A (16)	E (54)	7.48	7.40	7.45	6.94	P
18601912114	SUKHENDU MONDAL	C (18)	C (18)	C (18)	D (15)	A (16)	A (48)	6.59	6.65	6.62		X
18601912115	SUMAN KANRAR	A (24)	B (21)	C (18)	A (24)	A (16)	A (48)	8.11	7.55	7.87	7.41	P
18601912116	SUMANA SAHA	E (27)	A (24)	A (24)	E (27)	E (18)	E (54)	9.15	8.70	8.96	8.69	P
18601912117	SUMIT BERA	C (18)	B (21)	C (18)	C (18)	A (16)	A (48)	7.19	6.95	7.09	6.92	P
18601912118	SUPROBHAT BHATTACHARJEE	A (24)	A (24)	B (21)	B (21)	A (16)	A (48)	7.15	7.70	7.38		X
18601912119	SURAJ LAHA	A (24)	A (24)	B (21)	B (21)	A (16)	A (48)	7.44	7.70	7.55		X
18601912120	SUSMI SEN	B (21)	A (24)	A (24)	E (27)	E (18)	E (54)	8.85	8.40	8.66	8.57	P

18601912 121	TAMAL KHAN	B (21)	A (24)	C (18)	C (18)	E (18)	O (60)	7.26	7.95	7.55	7.13	P
18601912 122	TANIA KARMAKAR	A (24)	E (27)	A (24)	O (30)	O (20)	O (60)	9.15	9.25	9.19	8.77	P
18601912 123	TANMOY DAS BISWAS	C (18)	B (21)	D (15)	B (21)	E (18)	E (54)	7.56	7.35	7.47	6.9	P
18601912 124	TILOTTAMA BHATTACHAR YA	E (27)	O (30)	E (27)	O (30)	O (20)	O (60)	9.33	9.70	9.49	9.22	P
18601912 125	UDITA GHOSH	B (21)	B (21)	B (21)	C (18)	E (18)	O (60)	7.44	7.95	7.66		X
18601912 126	UDITA MAJUMDER	B (21)	B (21)	B (21)	A (24)	E (18)	O (60)	7.89	8.25	8.04	7.8	P
18601913 102	ADITYA SEN	B (21)	A (24)	B (21)	B (21)	A (16)	O (60)	7.93	8.15	8.02	7.34	P
18601913 103	ANANYA SENGUPTA	C (18)	E (27)	A (24)	B (21)	O (20)	O (60)	8.52	8.50	8.51	8.3	P
18601913 104	ANUPAM BHOWMIK	B (21)	A (24)	B (21)	B (21)	A (16)	O (60)	7.44	8.15	7.74		X
18601913 105	ARNAB BHATTACHAR YYA	C (18)	B (21)	B (21)	C (18)	A (16)	O (60)	6.74	7.70	7.15		X
18601913 106	ARPAN BERA	C (18)	B (21)	D (15)	D (15)	A (16)	O (60)	7.52	7.25	7.40	7.46	P
18601913 107	KOUSHIK KUMAR PATRA	B (21)	A (24)	B (21)	B (21)	A (16)	O (60)	8.07	8.15	8.11	8.02	P
18601913 108	MD MOKTAR HOSSAIN	B (21)	B (21)	D (15)	C (18)	B (14)	E (54)	7.00	7.15	7.06		X
18601913 109	MRIDUL PAL	C (18)	B (21)	D (15)	B (21)	A (16)	E (54)	7.26	7.25	7.26		X
18601913 110	NIDHI TIWARI	C (18)	B (21)	C (18)	B (21)	A (16)	O (60)	7.11	7.70	7.36	7.05	P
18601913 112	RIYA BHATTACHARJ EE	C (18)	B (21)	C (18)	C (18)	A (16)	E (54)	6.89	7.25	7.04	6.84	P
18601913 113	SAIKAT DAS	B (21)	A (24)	D (15)	D (15)	A (16)	O (60)	7.48	7.55	7.51	7.19	P
18601913 114	SOUMITA BANERJEE	B (21)	A (24)	B (21)	A (24)	E (18)	O (60)	8.78	8.40	8.62	8.44	P
18601913 115	TANIA MAITY	B (21)	E (27)	A (24)	E (27)	E (18)	O (60)	8.26	8.85	8.51	8.28	P
18601913 116	TANIYA GHOSH	A (24)	A (24)	B (21)	C (18)	E (18)	O (60)	8.22	8.25	8.23	8.01	P

ANNEXURE-2

ACCREDITATIONS

2015-16

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

F.No. Eastern/1-2811658681/2016/EOA　　　　　　　　　　　　　　Date: 05-Apr-2016

To,

The Secretary (Technical education)
Govt. of West Bengal,
Bikash Bhawan, Room No. 602,
6th Floor Salt Lake, Kolkata-700091

Sub: Extension of approval for the academic year 2016-17

Ref: Application of the Institution for Extension of approval for the academic year 2016-17

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2012 notified by the Council vide notification number F-No.37-3/Legal/2012 dated 27/09/2012 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	Eastern	Application Id	1-2811658681
Name of the Institute	GURU NANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY	Permanent Id	1-10009621
Name of the Society/Trust	GURU NANAK EDUCATIONAL TRUST	Institute Address	157/F, NILGUNJ ROAD, KOLKATA, KOLKATA, West Bengal, 700114
Institute Type	Unaided - Private	Society/Trust Address	7,SARAT BOSE ROAD,KOLKATA,KOLKATA,West Bengal,700020

Opted for change from Women to Co-ed and Vice versa	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved and Vice versa	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

To conduct following courses with the intake indicated below for the academic year 2016-17

Application Id: 1-2811658681			Course	Full/Part Time	Affiliating Body	Intake 2015-16	Intake Approved for 2016-17	NRI Approval status	PIO / FN / Gulf quota Approval status	Foreign Collaboration/Twining Program Approval status
Program	Shift	Level								
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FULL TIME	West Bengal University of Technology, Kolkata	18	18	NA	NA	NA

Application Number: 1-2811658681　　　　　　　　　　　　　　　　　　　　　　Page **1** of **3**
Note: This is a Computer generated Report.No signature is required.　　　　　Letter Printed On:29 April 2016

Printed By : AE7268201

PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS	FULL TIME	West Bengal University of Technology, Kolkata	18	18	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACOLOGY	FULL TIME	West Bengal University of Technology, Kolkata	18	18	NA	NA	NA
PHARMACY	1st Shift	UNDER GRADUATE	PHARMACY	FULL TIME	West Bengal University of Technology, Kolkata	120	120	NA	NA	NA

The above mentioned approval is subject to the condition that GURU NANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Note: Validity of the course details may be verified at www.aicte-india.org

Dr. Avinash S Pant
Vice - Chairman, AICTE

Copy to:
1. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

2. **The Director Of Technical Education,**
   West Bengal

3. **The Registrar,**
   West Bengal University of Technology, Kolkata

4. **The Principal / Director,**
   GURU NANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY
   157/F, NILGUNJ ROAD,
   KOLKATA,KOLKATA,
   West Bengal,700114

5. **The Secretary / Chairman,**

Application Number: 1-2811658681
Note: This is a Computer generated Report.No signature is required.

Page **2** of **3**
Letter Printed On:29 April 2016

Printed By : AE7268201

All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

GURU NANAK EDUCATIONAL TRUST
7,SARAT BOSE ROAD,
KOLKATA,KOLKATA,
West Bengal,700020

6. **Guard File(AICTE)**

Application Number: 1-2811658681
Note: This is a Computer generated Report.No signature is required.

Page **3** of **3**
Letter Printed On:29 April 2016

Printed By : AE7268201

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

(Formerly West Bengal University of Technology)

Office of the Inspector of Colleges

BF-142, Salt Lake City, Kolkata – 700 064

Tel. No. : (033)2321-7588, (033) 2334-1014/1021/1025/1028/1031, Fax (033) 2321-8776

No. 186 / B.PHARM / Affiliation / 2016-17   Date : 30/05/2016

The **RENEWAL** affiliation is hereby accorded for the academic year **2016-17** under Section 5(4) of the West Bengal University of Technology Act, 2000 (West Bengal Act XV of 2000) to

GURU NANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY

157/F, NILGUNJ ROAD, KOLKATA, WEST BENGAL, 700114.

(College Code : 186)

for conducting the following course(s) with the intake indicated below :

PROGRAM	LEVEL OF COURSE	NAME OF COURSE	INTAKE FOR 2016-17
PHARMACY	UNDER GRADUATE	PHARMACY	120

The above affiliation is issued subject to fulfillment of the following terms and conditions :

1. That this Affiliation/Renewal Affiliation is being granted based on the (i) The hard copy of the computer generated report containing 113 Pages of the AICTE approved College list for the Academic Year 2016-2017 duly authenticated by the Hon'ble Vice Chancellor dated 19.05.2016 which had been received by him through email dated 18.05.2016, (ii) Inspection report dated 03.03.2016 and (iii) Decision dated 19.05.2016 of the Hon'ble Vice Chancellor, MAKAUT, WB in the File No. IC-184/2016.

2. That the sponsoring Society / Trust/Company established under Section 25 of Companies Act 1956 shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the MAKAUT, WB and AICTE from time to time and for meeting recurring expenditure.

3. That the admission and conduct of courses shall be made in accordance with the regulations notified by the State Govt., MAKAUT, WB and AICTE from time to time.

4. That the curriculum of the course, the procedure for evaluation/assessment of students and infrastructure in the classes, laboratories & library shall be in accordance with the norms prescribed by the MAKAUT, WB and AICTE.

5. That the Institution shall not allow closure of the Institution or discontinuation of the course(s) or start any new course(s) of after intake capacity of seats without the prior approval of the MAKAUT, WB and AICTE.

6. That no excess admission shall be made by the Institution over and above the approval intake under any circumstances. In case any excess admission is reported to / founded by the MAKAUT, WB, appropriate penal action including withdrawal of affiliation shall be initiated against the Institution.

7. That the Institution shall not conduct any course(s) in the field of technical education in the same premises / campus and / or in the name of the Institution without prior permission / approval of MAKAUT, WB and AICTE. In case any violation is reported to / founded by the MAKAUT, WB, appropriate penal action including withdrawal of affiliation shall be initiated against the Institution.

8. That the Institution shall not conduct any non-technical course(s) in the same premises / campus under any circumstances. In case any violation is found by the MAKAUT,WB, appropriate penal action including withdrawal of affiliation shall be initiated against the Institution.

9. That the Institution shall operate only from the approved location, and that the Institution shall not open any off campus study centres / extension centres directly or in collaboration with any other Institution / University / Organisation for the purpose of imparting technical education without obtaining prior approval from the MAKAUT,WB and AICTE.

10. That the accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the MAKAUT,WB.

11. That the Institution shall furnish requisite returns & reports as desired by MAKAUT,WB in order to ensure proper maintenance of administrative & academic standards

12. That the Director / Principal and the teaching staff, Technical Assistants and other staff shall be selected according to procedures, qualifications and experience prescribed by the MAKAUT,WB / AICTE / UGC from time to time and pay scales and other allowances & benefits shall be as per the norms prescribed by the Govt. of W.B. / UGC / AICTE from time to time.

13. That if the Institution fails to disclose the information or suppress and/or misrepresent the information, appropriate action could be initiated including withdrawal of MAKAUT,WB affiliation.

14. MAKAUT,WB may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards prescribed by MAKAUT,WB/AICTE. Deficiencies / Shortcomings if any (in respect of built-up area requirement, instructional area requirement, laboratories requirement, computer requirement, library requirement, full-time faculty members requirement and other desirable requirements etc. in accordance with the AICTE / MAKAUT,WB norms) as were/will be pointed out shall have to be removed within a reasonable time to be prescribed by MAKAUT,WB failing which penal action including withdrawal of affiliation shall be initiated against the Institution.

15. That the MAKAUT,WB may also conduct inspections with or without notifying the dates to verify specific complaints of mis-representation, violation of norms and standards, mal-practices etc. Adverse findings will lead appropriate penal action including withdrawal of affiliation.

16. The Institute shall take appropriate measures for prevention of ragging in any form, in the light of directions of Supreme Court of India in Writ Petition No. © 656/1998 and norms as stipulated by the UGC **& AICTE**.

17. The Institution shall remain bound by the norms, rules and regulations formulated by the University in respect of the conditions of affiliation, course & fee structure, syllabi content and academic regulations governing the conduct of the course(s) and shall pay fees / charges to be fixed by the University in respect of inspection, affiliation, registration of students, examination fees, etc. including any subsequent changes therein introduced by the University from time to time.

    In the event of closure of the institution, the Organizing Society / Trust will not close Institution till the last batch of students admitted in the academic programmes complete the total duration of their respective academic programmes (i.e. 2 years, 3 years, 4 years etc. as the case may be).

18. The University will have no financial liability whatsoever for conducting the course(s).

Any infringement / contravention / non-compliance of the conditions mentioned above lead to withdrawal of affiliation. All liabilities arising out of such withdrawal would solely rest upon to that of organizing Trust / Society. After completion of the academic year **(2016 – 2017)**, the Institute will seek renewal of affiliation course-wise for the year **(2017 – 2018)**.

Checked & Verified

S. Saha

(Sujit Kumar Saha)

Inspector of Colleges

Copy forwarded for information and necessary action to :
1. The Principal / Director,
   GURU NANAK INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY
   157/F, NILGUNJ ROAD, KOLKATA, WEST BENGAL, 700114.
2. The Chairman, West Bengal Joint Entrance Examinations Board, AQ 13/1, Sector V, Salt Lake, Kol – 91.
3. The Principal Secretary, HED, Govt. of W.B., Bikash Bhavan, Salt Lake, Kolkata – 700 091.
4. The Regional Officer, Eastern Regional Office, AICTE, Block LB, Sector III, Salt Lake, Kolkata - 98.
5. The Vice Chancellor's Unit.
6. The Registrar's Unit.
7. The Controller of Examinations' Unit.
8. The Finance Officer's Unit.
9. The Inspector of Colleges' Unit.
10. GENERAL Guard File.
11. AFFILIATION GUARD FILE.
12. College File.

Inspector of Colleges

PHARMACY COUNCIL OF INDIA

(Constituted under the Pharmacy Act, 1948)

TELEGRAM	: `FARMCOUNCIL'	Combined Councils' Building,
TELEPHONE	: 23239184, 23231348	Temple Lane, Kotla Road
FAX No.	: 011-23239184	Aiwan-E-Ghalib Marg
E-MAIL	: pci@ndb.vsnl.net.in	Post Box No.7020
WEBSITE	: www.pci.nic.in	New Delhi – 110 002

Ref.No.17-890/2015-PCI   5362-65
      32-395/2014-PCI

Speed Post   3 0 MAR 2016

The Principal
Guru Nanak Institute of
Pharmacy Science and Technology,
157/F, Nilgunj Road, Panihati,
Kolkata – 700 114 (West Bengal).

Sub: Consideration of approval of the D.Pharm/B.Pharm./Pharm.D/Pharam.D &
Pharm.D(PB) course and examination.

Sir/Madam,

This has a reference to the subject cited above. Please find attached herewith the decision of 269th Executive Committee meeting of PCI (Feb., 2016) in respect of your institute. The same are posted on Council's website www.pci.nic.in also.

The recommendation of the Executive Committee will be placed in the next Central Council meeting of PCI for ratification.

This is for your information.

Yours faithfully

(ARCHNA MUDGAL)
For Registrar-cum-Secretary

...2

Cc to –

1. The Secretary
   West Bengal State Council for
   Tech. Education
   "Kolkata KarigoriBhavan"
   2nd Floor, 110, S.N. Banerjee Road
   Kolkata – 700 013 (West Bengal).

2. The Registrar
   West Bengal University of Technology,
   BF-142, Sector – I, Salt Lake,
   Kolkata – 700 064 (West Bengal).

3. The Registrar,
   West Bengal Pharmacy Council,
   8, Lyons Range, (3rd floor),
   KOLKATA– 700 001 (W.B.).

(ARCHNA MUDGAL)
For Registrar-cum-Secretary

269/EC (28th & 29th Feb. 2016) Bhubaneshwar

Item No. Course IR No.	State/ File No. Name of institutions	For admns. Limited to	Approved for conduct of course/ u/s 12 / extension upto academic session	Name of the Examining Authority
Item No.22 Diploma IR No.5th (July, 2015)	**WEST BENGAL** 17-890/2014-PCI Guru Nanak Institute of Pharmacy Science and Technology, 157/F, Nilgunj Road, Panihati, Kolkata – 700 114.	60	extension upto 2017-2018	The Secretary West Bengal State Council for Tech. Education "Kolkata KarigoriBhavan" 2nd Floor, 110, S.N. Banerjee Road Kolkata – 700 013.
Degree IR No.5th (July, 2015)	32-395/2014-PCI Guru Nanak Institute of Pharmacy Science and Technology, 157/F, Nilgunj Road, Panihati, Kolkata – 700 114.	100 (Raise in admissions from 60 to 100 from 2015-2016 a.s. subject to neutralization of 140 excess admissions made during 2012-2013. 2013-2014 and 2014-2015 academic session as per following details - <table><tr><td>Session</td><td>Excess admission to be neutralised</td><td>Admns. to be made</td></tr><tr><td>2016-2017</td><td>47</td><td>53</td></tr><tr><td>2017-2018</td><td>47</td><td>53</td></tr><tr><td>*2018-2019</td><td>46</td><td>54</td></tr></table> * if approval is extended by the PCI.	extension upto 2017-2018	The Registrar West Bengal University of Technology, BF-142, Sector - I Salt Lake, Kolkata – 700 064.

ANNEXURE-3

RESEARCH PUBLICATIONS

2015-16

LIST OF PAPERS PUBLISHED IN 2015-16

1. **R. Deb Mondal, A. Banerjee, A. Bala**, **A. Sengupta**. "*Avicennia alba*: The New phytochemical weapon to fight against acute inflammation." *International Journal of Pharmacology and Pharmaceutical Sciences:* 2015; **2(5)**, 6-12.

2. **P. Saha**, U. K. Mazumder, P.K. Haldar. "Evaluation Of Antiinflammatory And Antinociceptive Properties Of *L.siceraria* Aerial Parts." *International Journal of Pharma Sciences and Research*: 2015; **6(5)**, 874-881.

3. S. Verma , **U Debnath**, P. Agarwal, K.Srivastava, Y. S. Prabhakar. " *In Silico* Exploration for New Antimalarials: Arylsulfonyloxy Acetimidamides as Prospective Agents." *Journal of Chemical information and Modelling:* 2015; **55(8)**,1708-19.

4. R. N. Kushwaha, **U. Debnath**, P. Singh, R. Saxena, S.K. Gupta, R. K. Tripathi, H. H.Siddiqui, S. B. Katti. "New piperazine-derived NNRTI's as anti-HIV agent: Synthesis, biological evaluation and molecular docking studies". *Indo American Journal of Pharm Research*. 2015; **5 (01)**, 408-421.

5. Saxena R, Gupta G, Manohar M, **Debnath** U, Popli P, Prabhakar Y.S., Konwar R, Kumar S, Kumar A, Dwivedi A; Spiro-oxindole derivative 5-chloro-4',5'-diphenyl-3'-(4-(2-(piperidin-1-yl) ethoxy) benzoyl) spiro[indoline-3,2'-pyrrolidin]-2-one triggers apoptosis in breast cancer cells via restoration of p53 function.*Int J Biochem Cell Biol.* 2016 Jan; 70:105-17.

6. S. K. Kundu, **S. Chatterjee, A. Sen Gupta**. "Pharmacognostic evaluation and determination of appropriate methodology for extraction of important bioactive compounds of Aerva sanguinolenta leaves." *International Journal of Pharmacology and Pharmaceutical Sciences*: 2015; **2(4),** 11-20.

Research Article

Avicennia alba: The New phytochemical weapon to fight against acute inflammation

Rahul Deb Mondal, Anirban Banerjee, Asis Bala[*], Abhijit Sengupta
Division of Pharmacology, Guru Nanak Institute of Pharmaceutical Science and Technology, 157/F Nilgunj Road, Panihati, Sodepur, Kolkata-700114
*Corresponding Author

ABSTRACT

The aim of this study was to evaluate the potential of *Avicennia alba* Blume, (Family-Avicenniceae) as a safe and effective anti-inflammatory agent. *In-vitro* haemolytic and anti-inflammatory activity of the ethanol extract was performed using RBC membrane stabilising and anti-protein denaturation assays. The *in vivo* anti-inflammatory activity was evaluated using acute inflammatory model by carrageenan-induced rat paw oedema using Wistar Rat (n = 6) whereas the level of serum nitric oxide (NO) was estimated as a probable mechanism of action. The ethanol extract in different doses (200 and 400 mg/kg, p.o) exhibited dose dependent and significant anti-inflammatory activity in *in vitro* and acute model of inflammation. During the study there was a time dependent decrease of percentage increase of carrageenan induced paw volume by the treatment. However, the effect of the extract on inhibition of the nitric oxide generation during inflammation was also significant (p<0.05). The ethanol extract of *Avicennia alba* is having a immunotherapeutic efficacy to treat acute inflammation in various diseases.

INTRODUCTION

The history of inflammation is as old as man's existence in this planet. It is one of the most fundamental responses of the cells and tissue to injury and first line of immunity to the cells. It is essentially a defence reaction but sometimes it over do itself either in intensity or in duration and cause lot of suffering and pain [1]. Even though modern drugs are effective in the management of inflammation and associated conditions, but their use is often limited because of side effects [2]. In recent years, there is growing realization that apart from being safer, economical and easily available, herbs, phytochemicals and herbal products can influence the course of inflammatory diseases and may provide an amalgamation of nutritional substances, which help in restoring and maintaining wear and tear of tissues. Therefore, it would be rational to scientifically evaluate the traditional medicines used for their potential use in inflammatory diseases. *Avicennia alba* Blume, (Family-*Avicenniceae*), locally known as 'Sada Bain', grows commonly in the mangrove areas. The *Avicennia alba* Linn. is native and common throughout much of India, Burma and Malacca and dry areas of Ceylon and is often grown in Southern Asia to Southeast Asia, Australia and Oceania [3]. In India it occurs along the east and west coasts from Sunderbans up to Maharashtra. A. alba is a rich source of naphthaquinones [4]. The bark and seeds of A.alba are used as a fish poison and the resin used in birth control, ulcers treatment, skin diseases and also used to cure tumors [5]. The pharmacological activities like animicrobial activity [6], antinociceptive and antidiarrhoeal activities [3] are reported. Recently three new naphthoquinones and their analogues, named avicequinone-A (1), -B (2),-C (3), and avicenol-A (4), -B (5), -C (6), respectively, were isolated from the stem bark of Avicennia alba [7] and there was also presence of some antioxidant compound [8]. Presence of these compounds exhibit a wide spectrum of medicinal properties, such as anti-cancer, anti-inflammatory, anti-microbial [9, 10]. Taking this in view the present study was focused on evaluating the *in vitro* and *in vivo* anti-inflammatory activity of ethanol extract of *Avicennia alba* using scientific approach.

MATERIALS AND METHODS

Collection and authentication of plant

Aerial parts of *Avicennia alba (Avicenniceae)* were collected from the mangrove forest of Sunderban, West Bengal, India. The plant was identified and authenticated at Botanical Garden, Howrah, India. The identified voucher of herbarium (Specimen Number: CNH/128/2011/TECH2/637) is preserved in our laboratory for further reference.

Drugs and chemicals

Carrageenan (Sigma- Aldrich, St. Louis, MO, USA), Bovine serum albumin, tris-buffer, glacial acetic acid, ethanol, diclofenac sodium (Voveran, Novartis). All the reagents and chemicals used were of analytical grade.

Plant extractaction

Fresh aerial parts of *Avicennia alba* were cut, shade dried and powdered in grinder. The known quantity of powdered plant part was extracted with ethanol using soxhlet apparatus. The extra solvent was evaporated on rotary evaporator (Scilogex; RE-100-Pro) at 40° C. The dried extract was dissolved in distilled water to prepare the drug extract (EEAA) and used for pharmacological studies.

Erythrocytes membrane stabilizing activity

In vitro haemolytic activity (membrane stabilizing activity) was measured using the method of [11] with some modifications. Blood was collected from a healthy rat in a tube containing heparin. The blood was centrifuged at 1500 rpm for three minutes in a laboratory centrifuge. Plasma (supernatant) was discarded and the pellet was washed three times with sterile phosphate buffer saline solution (pH 7.4) by centrifugation at 1500 rpm for 5min. The cells were resuspended in normal saline to 1%. *In vitro* haemolytic activity was performed by spectrophotometer method [12]. A volume of 0.5 ml of the cell suspension was mixed with 0.5 ml of the plant extracts (10, 100, 200 and 500 μg/ml concentrations in phosphate buffer saline). The mixtures were incubated for 30 min at 37°C in an incubator. The mixture was centrifuged at 1500 rpm for 10 min in a laboratory centrifuge. The free haemoglobin in the supernatant was measured in UV-VIS spectrophotometer at 540 nm. Phosphate buffer saline and distilled water were used as minimal and maximal haemolytic controls. The level of percentage haemolysis by the extracts was calculated according to the following formula:

% Haemolysis=$(A_t-A_n/A_c-A_n)\times100$ Where: A_t is the absorbance of test sample. A_n is absorbance of the control (saline control) A_c is the absorbance of the control (water control)

In vitro anti-inflammatory activity

The anti-inflammatory activity was evaluated by protein anti-denaturation method [13] with slight modifications. A stock solution of 0.2%w/v of BSA was prepared in tris-buffer saline and pH was adjusted from 8.54 to 6.74 using glacial acetic acid. Many replicates of 500 μl of the Bovine serum albumin stock solution were pipette out and the test compound EEAA and standard Diclofenac sodium was dissolved in ethanol and added to the BSA solution to make various concentrations like 50, 100, 150,200 and 400 μg/ml. The control consists of 500 μl BSA with 4.5 ml ethanol. The samples were then heated to 72 °C for 5 min in 2.0 ml Eppendrof tubes in metal racks then cooled for 20 min under laboratory conditions and absorbance were read using spectrophotometer at 660nm. The percentage inhibition of precipitation (stabilization of the protein) was determined on a percentage basis relative to the control as in equation shown below:

$[(C-T)/C] \times100$ Where C= Absorbance of Control, T= Absorbance of Test

Experimental animals

Adult Wistar Albino rats of either sex (150-175g) and Swiss albino mice (25–30 g) of approximately the same age, used for the present investigation were obtained from Chakraborty Enterprises, Kolkata, India. They were grouped and housed in polyacrylic cages (38 cm × 23 cm × 10 cm) with not more than four animals per cage and maintained under standard environmental conditions at temperature (25±2° C), relative humidity 50% with alternate cycle of 12 h of darkness and light each. Rats were fed with standard pellet diet (Provimi Animal Nutrition India Pvt. Ltd., Mumbai, India) and water *ad libitum*. The rats were acclimatized to laboratory conditions for 10 days before commencement of the experiment and were fasted for at least 12 h before the test. The experimental protocol was approved by the Institutional Animal Ethics Committee (IAEC) constituted in accordance with the rules and guidelines of the Committee for the Purpose of Control and Supervision on Experimental Animals (CPCSEA),

India (GNIPST/IAEC/2013/05).

Acute Oral Toxicity Study

Acute toxicity study was carried out as per OECD guidelines- 425. Five Swiss albino mice were used for studies which were fasted overnight, providing free access to water. The test extract was administered orally at one dose level of 2000 mg/kg body weight and animals were observed continuously for the first 4 h and then periodically up to 48 h for toxicity and mortality.

Carrageenan-induced paw edema in rats

This method is the most commonly used method for the evaluation of anti-inflammatory drugs. So, *in-vivo* anti-inflammatory effect was evaluated by this method as described in [14] with slight modifications. 24 Wistar rats were divided into four groups (n = 6). Acute inflammation was produced by sub plantar injection of 0.1 ml of 1% w/v Carrageenan suspension in sterile normal saline in the left hind paw of each rat. Rats were pre-treated orally with normal saline (1ml/100g; Group I; Control), EEAA at low and high dose (200 and 400 mg/kg; Group II; Low Dose and III; High Dose) and diclofenac sodium (15 mg/kg; Group IV; Std. Drug) respectively for 7 days before carrageenan injection. The rat paw volume up to the ankle joint was measured using Plethysmometer (Ugo Basile, Italy) from 0-3 h at an interval of 30 min. The mean changes in injected paw volume with respect to initial paw volume were calculated. Percentage increase of paw volume between treated and control group was calculated using following formula: % Increase of paw volume = (Final – Initial) $\times 100$/ Initial

Measurement of Serum nitric oxide (NO) Concentration:

Twenty-four hours after the last dose and after 18 h of fasting, blood was collected from rats of each group, from retro orbital plexus for the estimation of Serum NO concentration and then sacrificed by Ketamine injection (160 mg/kg b.w.). Total nitrite/nitrate in serum, an indicator of nitric oxide (NO) synthesis, was measured by Griess reaction [15]. Briefly; serum was mixed with 5% TCA (1:9 dilution) and centrifuged (8000 rpm for 5 minutes), supernatants were mixed with an equal volume of Griess reagent (1:1 mixture of 0.1% napthylethylene diamine in water and 1% sulphanilamide in 2% phosphoric acid) and incubated for 30 minutes at 37 °C, and absorbance's were measured at an optical density of 546 nm (OD_{546}). The specific OD_{546} value was calculated by subtracting the OD_{546} of TCA from that of serum; the nitrite concentration was determined using a standard curve of sodium nitrite (0–100 μmol/L).

Data analysis

All values were shown as Mean ± SEM. Statistical analysis was performed using one-way analysis of variance (ANOVA) followed by Dun net's t test by using Graph Pad Prism version 5. $p<0.05$ was considered statistically significant.

RESULTS

The extract was initially approved as a safe remedy by the *in vitro* haemolytic assay. 49.80±0.55% haemolysis was observed at a concentration of 500 μg/ml when EEAA was directly incubated with erythrocytes for 30 min (Figure 1). From the graph (Figure 1) of *in vitro* haemolytic activity it can be concluded that in case of EEAA the value of IC_{50} is >500μg/ml.
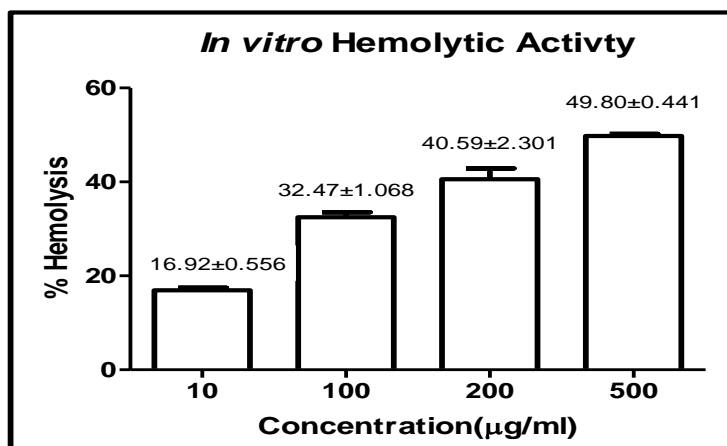
Figure 1: *In vitro* **haemolytic activity:** The values are expressed as Mean ± SEM using Graph Pad Prism version 5 software. Where the concentration of EEAA was plotted against % hemolysis.

During anti-protein denaturation assay, maximum inhibition by the extract, 58.280±0.890% was observed at concentration of 400 µg/ml whereas Diclofenac sodium, a standard anti-inflammatory drug showed the maximum inhibition of 68.355±1.425% at the concentration of 400 µg/ml (Figure 2).
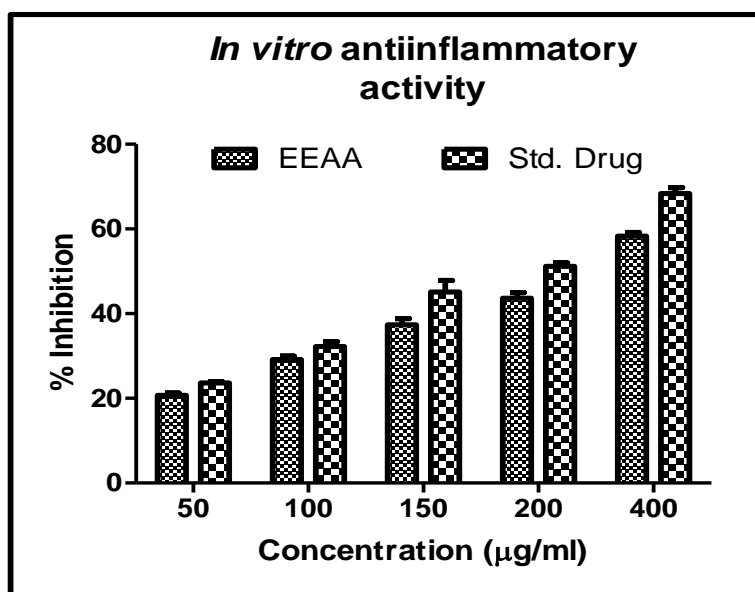
Figure 2: *In vitro* **anti-inflammatory activity:** Anti-protein denaturation assay was performed using different concentration of EEAA as well as standard drug diclofenac sodium. The values are expressed as Mean ± SEM using Graph Pad Prism version 5 software. Where the concentration of EEAA/Std. Drug was plotted against % inhibition.

In carrageenan induced rat paw edema test, the doses of 200 mg/kg and 400 mg/kg of EEAA showed significant inhibitory effect on "% increase in paw volume" (Figure 3).
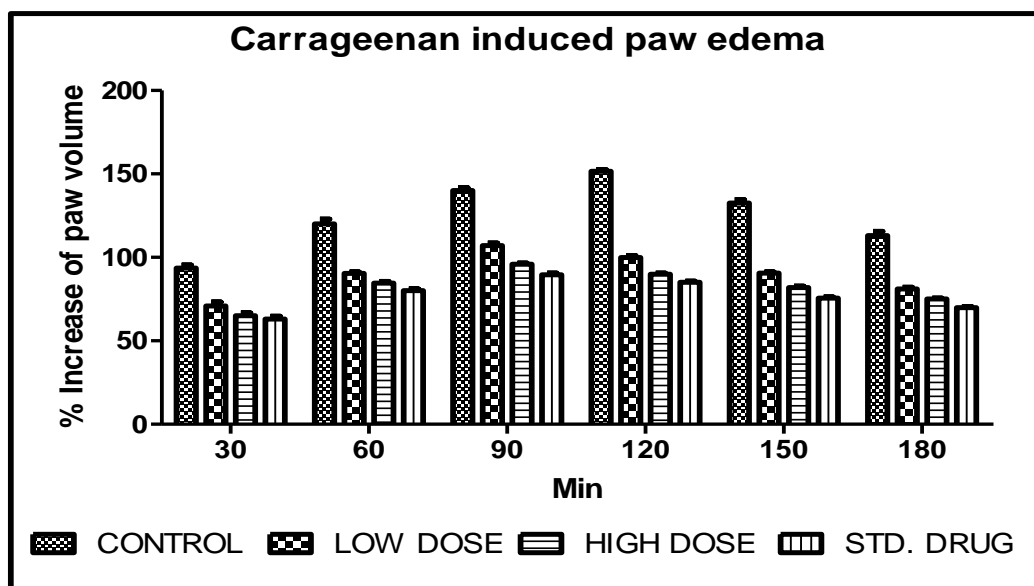
Figure 3: *In vivo* **Anti-inflammatory activity of EEAA by carrageenan induced paw edema model.** Acute inflammation was produced by the method described in material and methods section. The rat paw volume up to the ankle joint was measured using Plethysmometer from 0-3 h at an interval of 30 min.
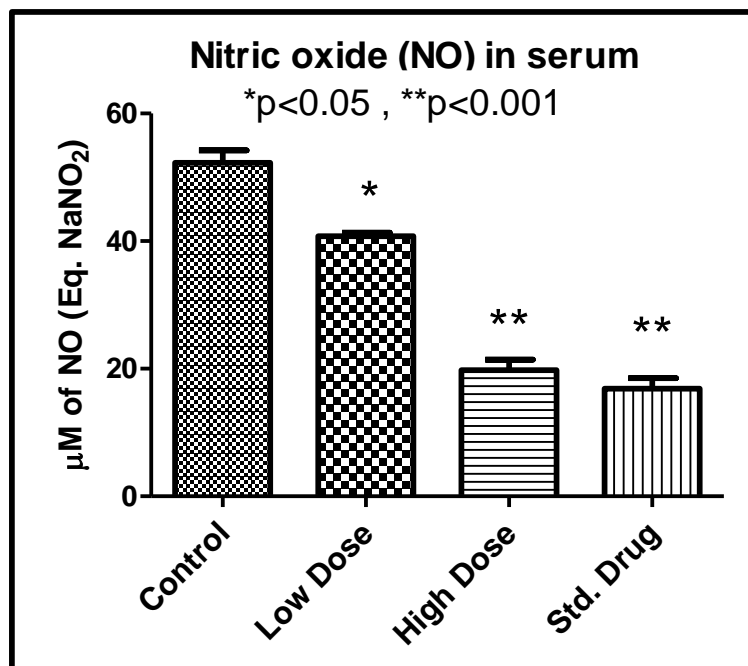
Figure 4: Measurement of serum NO as the evaluation of molecular mechanism. After the last measurement of paw thickness, rats of all groups were sacrificed and collected blood serum NO content was measured by the procedures described in ''Materials and methods'' and finally compared with EEAA untreated (CONTROL) group. Values are represented as mean ± SEM (n = 6) where ** p,0.01 and * p <0.05 were considered as highly significant and significant, respectively, with respect control group.

DISCUSSION

It was established that EEAA do not cause acute toxicity effects as the LD_{50} value was found as more than 2000 mg/kg. No death or signs of toxicity were observed in mice treated with extracts at dose 2000 mg/kg thus establishing its safety in use. Additionally it was found to be equally safe during erythrocyte haemolytic assay (Figure 1). Hence, EEAA can be used as a safe phytochemical for the treatment of different remedies. Denaturation of proteins is a well-documented cause of inflammation. Phenylbutazone, salicylic acid, flufenamic acid (anti-inflammatory drugs) etc, have shown dose dependent ability to thermally induced protein denaturation. As a part of this investigation on the mechanism of the anti-inflammatory activity, ability of extract to inhibit protein denaturation was studied. EEAA was effective in inhibiting heat induced albumin denaturation at different concentrations as shown in figure 2. The results also suggest that the tested ethanol extract have the potential *in vitro* anti-inflammatory activity.

Inflammation is the response of living tissues to injury. It involves a complex array of enzyme activation, mediator release fluid extravasations, cell migration, tissue breakdown and repair [16].The present study demonstrated that the ethanol extract of *Avicennia alba* has marked pharmacological potential to attenuate carrageennan induced acute inflammation in rat. Carrageenan induced rat paw edema is a suitable experimental animal model for evaluating the anti-edematous effect of natural products [17] and this is believed to be triphasic, the first phase (1 h after carrageenan challenge) involves the release of serotonin and histamine from mast cells, the second phase (2 h) is provided by kinins and the third phase (3hr) is mediated by prostaglandins, the cycloxygenase products and lipoxygenase products [18]. The metabolites of arachidonic acid formed via the cycloxygenase and lipoxygenase pathways represent two important classes of inflammatory mediators, prostaglandins (products of the cycloxygenase pathway) especially prostaglandin E_2 is known to cause or enhance the cardinal signs of inflammation, similarly, leukotriene B_4 (product of lipoxygenase pathway) is a mediator of leukocyte activation in the inflammatory cascade [19]. From the results, the EEAA inhibited Carrageenan induced rat paw edema at 200 mg/kg and 400 mg/kg in dose dependent manner (figure 3). In the present study, maximum paw edema was observed at the end of 2 h of carrageenan injection, that is, after the release of the mediators of inflammation. The probable cause of anti-inflammatory action against acute inflammation might be due to the inhibition of some or all of the mediators released within 3 h of carrageenan injection.The inflammatory reaction is characterized

with induction of PGs, cytokines and iNOS, producing (NO) [20]. NO is responsible for vasodilatation, increased vascular permeability and edema formation [21]. EEAA markedly inhibited the level of NO in present study (Figure 4). The mechanism responsible for NO inhibition may involve prevention of iNOS activity and it could be implicated in suppression of PGs generation. Conclusively, the results suggest that ethanol extract of *Avicennia alba* has marked effect in attenuating experimental inflammatory reactions in rat. This effect may be due to the presence of tannins, flavonoids and phenolic compounds present in the plant as reported earlier. Hence, further investigation is required to isolate the active compound responsible for the action and to evaluate it's potential to treat chronic inflammation.

ACKNOWLEDGEMENT

REFERENCES

1. Bhitre, M.J., S. Fulmali, M. Kataria, S. Anwikar and H. Kadri, 2008. Antiinflammatory activity of the fruits of piper longum Linn. Asian J. Chem., 20: 4357-4360.

2. Lipsky, P.E., 1999. The clinical potential of cyclooxygenase-2-specific inhibitors. Am. J. Med., 106: 51S-57S.

3. Rahman, M.A., S. Biswas, V. Bala, A.K. Shill and U. Bose, 2011. Antidiarrhoeal and antinociceptive activities of leafs Avicennia alba. Pharmacologyonline, 1: 492-500.

4. Ito, C., S. Katsuno, Y. Kondo, H.T. Tan and H. Furukawa, 2000. Chemical constituents of Avicennia alba. Isolation and structural elucidation of new naphthoquinones and their analogues. Chem. Pharm. Bull. (Tokyo), 48: 339-343.

5. Bandaranayake, W.M., 1998. Traditional and medicinal uses of mangroves. Mangroves Salt Marshes, 2: 133-148.

6. Veni, P.S., S. Sunitha and A. Srinivasulu, 2013. Evaluation of antibacterial activity on selected bacteria and screening of secondary metabolites of Avicennia alba stem. Int. J. Adv. Biotechnol. Res., 4: 511-517.

7. Bandaranayake, W.M., 2002. Bioactivities, bioactive compounds and chemical constituents of mangrove plants. Wetlands Ecol. Manage., 10: 421-452.

8. Banerjee, D., S. Chakrabarti, A.K. Hazra, S. Banerjee, J. Ray and B. Mukherjee, 2008. Antioxidant activity and total phenolics of some mangroves in Sundarbans. Afr. J. Biotechnol., 7: 805-810.

9. Ross, S.A., S.E. Megalla, D.W. Bisby and A.H. Awad, 1980. Studies for determining someantibiotic substance in some Egyptian plants. Screening of some antimicrobial activity. Fitoterpia, 51: 303-308.

10. Itoigawa, M., C. Ito, H.T. Tan, M. Okuda, H. Tokuda, H. Nishino and H. Furukawa, 2001. Cancer chemopreventive activity of naphthoquinones and their analogs from Avicennia plants. Cancer Lett., 174: 135-139.

11. Kumar, G., L. Karthik and K.V.B. Rao, 2011. Haemolytic activity of Indian medicinal plants toward human erythrocytes: An in vitro study. Elixir Applied Bot., 40: 5534-5537.

12. Yang, Z.G., H.X. Sun and W.H. Fang, 2005. Haemolytic activities and adjuvant effect of Astragalus Membranaceus Saponins (AMS) on the immune responses to ovalbumin in mice. Vaccine, 23: 5196-5203.

13. Umarani, N., K. Ilango, P. Valentina and T. Ishwarya, 2012. Molecular properties prediction, synthesis and bio-evaluation of triazines glued benzothiazole congeners. Ind. J. Pharm. Edu. Res., 46: 372-377.

14. Bala, A., P. Chetia, N. Dolai, B. Khandelwal and P.K. Haldar, 2014. Cat's whiskers flavonoid attenuated oxidative DNA damage and acute inflammation: Its importance in lymphocytes of patients with rheumatoid arthritis. Inflammopharmacology, 22: 55-61.

15. Mukhopadhyay, D., N.K. Das, S. Roy, S. Kundu, J.N. Barbhuiya and M. Chatterjee, 2011. Miltefosine effectively modulates the cytokine milieu in Indian post Kala-Azar dermal Leishmaniasis. J. Infect. Dis., 20: 1-10.

16. Katzung, B.G., 2004. Basic and Clinical Pharmacology. 9th Edn., McGraw Hill, London, pp: 641-646.

17. Sertie, J.A.A., A.C. Basile, S. Panizza, A.K. Matida and R. Zelnik, 1990. Anti-inflammatory activity and sub-acute toxicity of artemetin. Planta Med., 56: 36-40.

18. Vinegar, R., W. Schreiber and R. Hugo, 1969. Biphasic development of carrageenin oedema in rats. J. Pharmacol. Exp. Therapeutics, 166: 96-103.

19. Di Rosa, M., J.P. Ground and D.A. Willoughby, 1971. Studies of the mediators of the acute inflammatory response induced in rats in different sites by carrageenan and turpentine. J. Pathol., 104: 15-29.

20. Lefkowitz, D.L., M.P. Gelderman, S.R. Fuhrmann, S. Graham and J.D. Starnes et al., 1999. Neutrophilic myeloperoxidase-macrophage interactions perpetuate chronic inflammation associated with experimental arthritis. Clin. Immunol., 91: 145-155.

21. Moncada, S., R.M. Palmer and E.A. Higgs, 1991. Nitric oxide: Physiology, pathophysiology and pharmacology. Pharmacol. Rev., 43: 109-142.

Evaluation Of Antiinflammatory And Antinociceptive Properties Of *L.siceraria* Aerial Parts

P. Saha[1, 2], U. K. Mazumder[1, *], P. K. Haldar[1]

[1]Department of Pharmaceutical Technology,
Jadavpur University, Kolkata- 700 032, India.
[2]Guru Nanak Institute of Pharmaceutical Science and Technology.
157/F, Nilgunj Road, Panihati, Kolkata-700114, India.
E-mail address: prerona_saha@rediffmail.com
Phone: +91 9836152837

ABSTRACT

Purpose: The objective of the present study was to evaluate the anti-inflammatory and antinociceptive activity of the methanol extract of *Lagenaria siceraria* aerial parts (MELS) at the doses of 200 and 400 mg/kg body weight. **Methods:** Hot plate, tail immersion and acetic acid induced writhing response in mice were used to assess antinociceptive activity. Antiinflammatory property was studied using acute inflammatory models (such as, carrageenan, dextran and histamine-induced rat paw oedema) as well as on chronic inflammatory model (cotton pellet granuloma test). **Results:** Potent antinociceptive activity was exerted by the extract. In case of acute inflammatory models, MELS inhibited rat paw oedema in dose dependent manner. In the chronic inflammatory model, daily dosing of 400 mg/kg of the extract significantly suppressed granuloma formation. **Conclusion:** Thus the extract of *L. siceraria* exhibited significant anti-inflammatory and antinociceptive activities.

Keywords: Anti-inflammatory activity, Antinociceptive activity, *L.siceraria,* Cucurbitaceae, carrageenan.

1.   INTRODUCTION

Inflammation is a defense mechanism and protective response of vascular tissues to harmful stimuli like allergens, pathogens, irritants, damaged cells [1]. However if it runs unchecked, may lead to onset of diseases such as arthritis, atherosclerosis, Alzheimer's disease, diabetes, cancer and so on [2]. Algesia (pain) is an ill-defined, unpleasant sensation occurs by external or internal noxious stimuli. Pain is a warning signal, excessive pain is unbearable and leads to sinking sensation, sweating, nausea, rise or fall in BP, tachypnoea. Many synthetic drugs are available in market to treat inflammation and pain, leading to side effects [3,4]. As a result search for alternatives is of the utmost importance. The ethnopharmacological uses as well as certain biological activities exhibited by *L. siceraria* indicate it to be a good source of phytomedicine.

Lagenaria siceraria (Mol.) Standley from cucurbitaceae family, popularly known as bottle gourd (English), has wide occurrence throughout India as an edible vegetable. It is a pubescent or trailing herb, with bottle or dumb-bell shaped fruits. Both of its aerial parts and fruits are commonly consumed as vegetable as well as used as traditional medicine in various countries like India, China, European countries, Brazil, Hawaiian island etc [5]. Antihepatotoxic, analgesic and anti-inflammatory, hypolipidemic, antihyperglycemic and antioxidant activities of its fruit extract have been evaluated. *Lagenaria siceraria* fruits are good source of vitamin B complex, ascorbic acid, fibers, proteins, cucurbitacins, saponins, fucosterols and compesterols, polyphenolics, flavones-C-glycoside. Methanol extract of its leaves showed the presence of sterols, polyphenolics, flavonoids, saponin, protein and carbohydrates [6-14]. Traditionally *L. siceraria* has been used in treatment of many types of pain and inflammatory conditions, however no such scientific report is available on its aerial parts. The present study was therefore carried out to investigate the anti-inflammatory and antinociceptive activities of methanol extract of *L.siceraria* aerial parts (MELS).

2.   MATERIALS AND METHODS

2.1.Plant material

The aerial parts of *L.Siceraria* were collected in November 2008, from Madanpur, West Bengal, India and identified by the Botanical Survey of India, Howrah, India. A voucher specimen (P/LS/1/08) was retained in our laboratory for further reference.

2.2.Preparation of plant extract

The aerial parts were dried and powdered in a mechanical grinder. The powdered material was extracted by methanol using soxhlet apparatus. This extract was filtered and concentrated in *vacuo* and kept in a vacuum

desiccator for complete removal of solvent. The yield was 18.13% w/w with respect to dried powder. Aqueous suspension of MELS was prepared using 2 % (v/v) Tween-80 and used for the pharmacological studies.

2.3. Animals

Healthy Swiss albino mice (20 ± 2 g) of either sex were taken for acute toxicity study. Healthy Wistar albino male rats (150 g ± 20) were used for the antiinflammatory study and healthy Swiss albino male mice (20 ± 2 g) were used for the antinociceptive study. The animals were maintained at standard laboratory conditions and fed with commercial pellet diet (Hindustan Lever, Kolkata, India) and water *ad libitum*. The animals were acclimatized to laboratory condition (temperature 25±2°C) with dark/ light cycle (12 /12 h) for one week prior to the study. Before the experiment, the animals were fasted for 18 h. The experiments were performed following the guidelines of the Institutional Animals Ethical Committee.

2.4. Phytochemical analysis

Preliminary phytochemical screening of the extract was carried out using standard methods [15].

2.5. Acute toxicity study

Healthy Swiss albino mice (20 ± 2 g), starved overnight, were divided into five groups (n=4). Group I-IV animals were orally fed with MELS in increasing dose levels of 0.5, 1.0, 1.5 and 2.0 g/kg b.wt, while group V (untreated) served as control. The animals were observed continuously for first 2 h for any gross change in behavioral, neurological and autonomic profiles or any other symptoms of toxicity and mortality if any, and intermittently for the next 6 h and then again after 24 h , 48 h and 72 h for any lethality or death. One-tenth and one-fifth of the maximum safe dose of the extract tested for acute toxicity, were selected for the experiment [16].

2.6. Antiinflammatory activity

2.6.1. *Carrageenan induced rat paw oedema*

The rats were randomly divided into four groups (n=6). The rats in different groups were treated orally with MELS (200 and 400 mg/kg b.wt.), the reference drug - indomethacin (10 mg/kg b.wt.), and vehicle (5 ml/kg of 2% v/v Tween -80). The extracts and drugs were adminstered 30 min prior to subplantar injection of 0.1 ml of 1% w/v freshly prepared suspension of carrageenan in normal saline in the right hind paw of each rat [17]. Using plethysmometer, the paw volume was measured initially (at 0th h) and then at 1, 2, 3 and 4 h after carrageenan injection.

The antiinflammatory activity was calculated by the following equation:

Antiinflammatory activity (% inhibition of rat paw oedema) = (1-D/C) X 100, where, D represents difference in paw volume after extract/drug administration and C represents difference in paw volume in control groups [18].

2.6.2. *Dextran induced rat paw oedema*

The animals were treated in a manner similar to that of carrageenan induced paw oedema models; dextran (0.1 ml 1% w/v in normal saline) was used instead of carrageenan [17].

2.6.3. *Histamine induced rat paw oedema*

In this model rat hind paw oedema was induced by subplantar injection of 0.1 ml 1% w/v freshly prepared histamine in normal saline and the paw oedema was measured by the method of Suleyman *et al* [18].

2.6.4. *Cotton pellet granuloma*

Cotton pellet granuloma was induced according to the method of D'Arcy *et al* [19]. The animals were divided into four groups (n=6). The rats were anesthetized and sterile cotton pellets weighing 10 ±1 mg were implanted subcutaneously into both sides of the groin region of each rat. Group I served as control and received vehicle (5 ml/kg of 2% v/v Tween -80). The extract, MELS, at the dose of 200 and 400 mg/kg was orally administered to group II and III animals for 7 consecutive days, starting from the day of implantation. Group IV rats received indomethacin (10 mg/kg, p.o.) for the same period. On 8th day, the animals were anesthetized and the pellets together with the granuloma tissues were carefully collected and made free from extraneous tissues. The wet pellets were weighed and then dried in an oven at 60°C until a constant weight was obtained. Increase in the dry weight of the pellets was taken as the measure of the granuloma formation.

2.7. Antinociceptive activity

2.7.1. *Hot Plate latent pain response test*

The mice were randomly divided into four groups (n=6). Group I served as control and received the vehicle (2% v/v Tween -80), group II and III received MELS at low and high dose (200 and 400 mg/kg, p.o.) respectively, while group IV was treated with standard drug, Pentazocin (5 mg/kg, s.c.), the reference drug. The hot-plate test was carried out according to the method of Eddy and Leimback [20]. Each mouse was placed on a 55° ± 1°C hot-plate to observe its pain responses (hind-paw-licking or jumping). The latent time was recorded as the analgesic parameter at before (0 min) and 30, 60, 90, 120 and 150 min after administration of test drugs.

Untreated mice with a background latent response time shorter than 5 s or longer than 30 s were excluded from the study.

2.7.2.*Tail immersion test*

The mice were randomly divided into four groups of six animals in each. Group I served as control and received the vehicle (2% v/v Tween -80), group II and III received MELS at low and high dose (200 and 400 mg/kg, p.o.) respectively, while group IV was treated with standard drug Pentazocin (5 mg/kg, s.c.). The basal reaction time to the heat stimuli was measured by immersing the tip of the tail (1-2cm) in a beaker of warm water maintained at $55° \pm 1°C$. The readings were taken after 30 min of administration of test drug [21].Tail withdrawal was taken as the end point, a cut off point of 15 sec was maintained to prevent the damage to the tail.

2.7.3.*Acetic acid induced writhing test*

Acetic acid induced writhing test, a chemical visceral pain model, was carried out by the method of Koster *et al* [22]. The mice were randomly divided into four groups (n=6). Group I served as control and received the vehicle (2% v/v Tween -80), group II and III received MELS at low and high dose (200 and 400 mg/kg, p.o.) respectively, while group IV was treated with Indomethacin (10 mg/kg, p.o.). Extracts and the standard drug were administered to the animals 1 h prior to the injection of acetic acid. Intraperitoneal injection of acetic acid (0.7%) at a dose of 0.1 ml/10g of body weight was used to create pain sensation. After acetic acid injection, the mice were placed in a clean box and the number of writhes was recorded for 10 min. Writhing movement was accepted as contraction of the abdominal muscle accompanied by stretching of hind limbs. The analgesic effects were calculated by comparing the number of abdominal writhes of the test group with that of the control group.

2.8.Statistical analysis

The values were expressed as mean ± S.E.M. The statistical significance was determined by Oneway ANOVA followed by post hoc Dunnett's test. Values of $p<0.05$ were considered as statistically significant.

3. RESULTS

3.1.Phytochemical analysis

Preliminary phytochemical screening of MELS revealed the presence of polyphenolics, flavonoids, glycosides, triterpinoids, saponin and carbohydrates.

3.2.Acute toxicity study

In acute toxicity study, MELS did not show any toxic effect upto the dose of 2 g/kg b.wt, accordingly 200 and 400 mg/kg b.wt were taken as low and high dose of MELS for the experiment.

3.3.Antiinflammatory activity

Subplantar injection of carrageenan in hind paw induced gradual increase in the paw volume in the control group. Methanol extract of *L.siceraria* at the doses of 200 and 400 mg/kg significantly ($p<0.05$) inhibited the oedema formation of rat paw after carrageenan challenge (Table.1). The reference drug, indomethacin at a dose of 10 mg/kg was also found to reduce the paw oedema significantly.

The differences in the paw volume after administration of extracts and standard drug indomethacin in dextran inoculated rats were presented in Table.2. At the dose of 200 and 400 mg/kg, MELS exhibited 37.50 and 47.92 % inhibition respectively in dextran induced paw oedema in rats. Significant anti-inflammatory activity produced by the extracts especially at high dose was quite comparable to that of the standard drug.

The antiinflammatory activity of MELS against acute pedal oedema induced by phlogestic agent histamine has been summarized in Table.3. Administration of the extract significantly inhibited the development of paw swelling after histamine injection in a dose dependent manner.

The effects of MELS and indomethacin on the proliferative phase of inflammation are summarized in Table.4. Significant reduction in the weight of cotton pellets i.e., marked reduction in granuloma formation was observed in case of MELS (400 mg/kg) treated rats as compared to that of vehicle treated ones and the effect was equipotent to that of standard drug treated rats. However the degree of reduction was not significant in case of low dose extract treated animals.

3.4.Antinociceptive activity

MELS produced significant analgesic activity at both low and high dose. In case of hot plate latent pain response test, a considerable increase in the reaction time to the heat stimulus was observed with respect to that of control group mice (Table.5). The highest reaction time of MELS (at high dose) was found to be 13.12 ± 0.68 s, however that of the standard drug, pentazocin was recorded as 14.55 ± 0.50 s.

In the tail immersion method, the extract considerably increased the latency of the mice to the heat stimulus. Values were found to be significant and dose dependent. Pre-treatment with MELS showed upto 7.00 ± 0.25 s of latency period while that produced by the standard drug pentazocin was found to be 7.80 ± 0.33 s (Table.6).

In case of the acetic acid induced writhing test, methanol extract of *L.siceraria* at doses of 200 and 400 mg/kg significantly reduced the acetic acid induced abdominal constrictions (Table.7) and the average number of writhes was significantly lowered upto 10.88 (59.25%) by MELS treatment. Analgesic effect of the extract was comparable to that of the standard drug, indomethacin (62.92%).

4. DISCUSSION

The present study explored potent antiinflammatory activity of MELS in both acute inflammatory (carrageenan, dextran, histamine) as well as chronic inflammatory (cotton pellet granuloma) studies in rats.

Carrageenan induced oedema has been commonly used as an experimental animal model for acute inflammation and is believed to be a biphasic event with involvement of different inflammatory mediators [23]. In the first phase (during the first 2 h after carrageenan injection), chemical mediators such as histamine and serotonin play important role, while the second phase (3 – 4 h after carrageenan injection) is sustained by prostaglandins release and mediated by bradykinin, leukotrienes, polymorphonuclear cells and prostaglandins produced by tissue macrophages. Present study revealed that administration of methanol extract of *L. siceraria* inhibited the oedema starting from the first hour and during all phases of inflammation, however, it was found to be more pronounced in later phase. This may be attributed to the inhibition of different aspects and chemical mediators of inflammation by MELS in the system.

Dextran induced oedema is a well-known experimental model in which the oedema is a consequence of liberation of histamine and serotonin from the mast cell [24]. In acute inflammatory model, histamine and serotonin are the important inflammatory mediators and act as vasodilator as well as increase the vascular permeability [3, 25]. Both the extracts were found to effectively suppress the dextran induced rat paw oedema as well as the oedema produced by histamine. The results suggest that the anti-inflammatory activity of the extract is possibly backed by its antihistamine and/or antiserotonin activity.

The cotton-pellet granuloma is widely used to evaluate the transudative and proliferative components of the chronic inflammation. The moist weight of the pellets correlates with transudate, the dry weight of the pellet correlates with the amount of granulomatous tissues [26, 27]. Chronic inflammation occurs by means of the development of proliferate cells.

The methanol extract of *L. siceraria* at high dose showed significant anti-inflammatory activity in cotton pellet induced granuloma, which reflects their efficacy in inhibiting granulocyte infiltration and the increase in the number of fibroblasts and preventing the synthesis of collagen and mucopolysaccharides during granuloma tissue formation and thus found to be effective in chronic inflammatory conditions. However at low dose the extracts could not produce significant effect in the chronic inflammation model.

The extract exerted potent antinociceptive activity in hot plate test and the results were equivalent to that of the standard drug during all the observation times when compared with control values. The hot plate method is considered to be selective for opioid like compounds in several animal species, however other centrally acting drugs including sedatives and muscle relaxants have also shown activity in this test. The results obtained from the present study reveals that the methanol extract of *L. siceraria* aerial parts relieved pain may be through central mechanism.

The extract also had a significant effect on acute pain model, *viz.* tail immersion test. Centrally acting analgesic drugs elevate pain threshold of animals towards heat and pressure. The effect of the extract on this pain model therefore further potentiates their antinocicetive effect through central mechanism.

Acetic acid induced abdominal constriction method is widely used for the evaluation of peripheral antinociceptive activity [28]. It is very sensitive and able to detect antinociceptive effects of compounds at dose levels that may appear to be inactive in other models, like tail flick test [29]. It has been reported that acetic acid irritates the peritoneal cavity leading to stimulation of local nociceptors located at the surface of the peritoneal cavity. This leads to the release of prostaglandins and other algogens with subsequent stimulation of pain at nerve endings. Local peritoneal receptors are postulated to be partly involved in the abdominal constriction response [30]. Inhibition of acetic acid induced pain by the extract suggests that it probably reduced pain response to acetic acid injection by suppressing the release of local inflammatory mediators like prostaglandin, bradykinin and histamine [31].

5. CONCLUSION

On the basis of above findings it may be concluded that methanol extracts of *L. siceraria* have potent antiinflammatory activity against both acute and chronic phases of inflammation and these may be beneficial in case of cancer, diabetes and rheumatoid arthritis condition by inhibiting the underlying pathological progression of inflammation [32]. Previous investigations showed that MELS possesses significant antioxidant activity [33]. The extract may exert its potent anti-inflammatory activity at least partially through its antioxidant activity. The promising analgesic activity observed in the present study on all the three models indicate that the methanol extracts of *L. siceraria* aerial parts can relieve pain through both central as well as peripheral mechanisms.

However further studies are required to establish the bioactive principle(s) and confirm the mechanism of action for these potent activities of the extract of *L. siceraria* aerial parts.

ACKNOWLEDGEMENT

REFERENCES

[1] L. Ferrero-Miliani, O. H. Nielsen, P.S. Anderson, et al. Chronic Inflammation: importance of NOD2 and NALP3 in interleukin-1 beta generation. Clin. Exp. Immunol., 2007, 147 (2): 227-35.
[2] P.M. Henson, R.C. Murphy. Mediators of the inflammatory process. 6th ed. Amsterdam: Elsevier, 1989.
[3] H.P. Rang, M.M. Dale, J.M. Ritter. Pharmacology, 4th ed. London: Churchill Livingstone, Edinburgh, 1999, p. 200.
[4] K.D. Tripathy. Essentials of Medical Pharmacology. 5th ed. New Delhi: Jaypee Brothers, 2004, pp. 167-170.
[5] K.R. Kirtikar, B.D. Basu. Indian Medicinal Plants. 2nd ed. Uttaranchal: Oriental Enterprises. 2003, Vol 5, pp.1551-1554.
[6] J.R. Deshpande, A.A. Choudhari, M.R. Mishra, et al. Beneficial effects of Lagenaria siceraria (Mol) Stand. fruit epicarp in animal models. Ind. J. Expt. Biol., 2008, 46: 234-242.
[7] J.R. Deshpande, M.R. Mishra, V.S. Meghre, et al. Antioxidant activity of Lagenaria siceraria (Mol) Stand. fruit. Nat. Prod. Rad., 2007, 6: 127.
[8] B.V. Ghule, M.H. Ghante, A.N. Saoji, et al. Hypolipidemic and antihyperlipidemic effects of Lagenaria siceraria (Mol) fruit extracts. Ind. J. Expt. Biol., 2006, 44: 905.
[9] B.V Ghule, M.H. Ghante, A.B. Upganlawar, et al. Analgesic and anti-inflammatory activities of L. siceraria (Mol) Stand. fruit juice extract in rats and mice. Pharmacog. Mag., 2006, 2: 232.
[10] A. Shirwaikar, K.K. Sreenivasan. Chemical investigation and antihepatotoxic activity of the fruits of Lagenaria siceraria. Ind. J. Pharm. Sci., 1996, 58: 197.
[11] M.K. Baranawska, W. Cisowaski. High performance chromatographic determination of flavones-C-glycosides in some species of cucurbitaceae family. J. Chrom. A, 1994, 675: 240.
[12] J.A. Duke. Handbook of phytochemical and constituents of GRASS herbs and economic plants. Florida: CRC press, 1999, p. 98.
[13] S. Sonja, S.S. Herman. Analysis of cucurbitacins in medicinal plants by HPLC-MS. Phytochem. Anal., 2000, 11: 121.
[14] B.N. Shah, A.K. Seth. Pharmacognostic studies of the Lagenaria siceraria (Molina) Standley, Int. J. Pharm. Tech. Res., 2010, 2(1): 121-124.
[15] C.K. Kokate. Preliminary phytochemical screening, Practical pharmacognosy. New Delhi: Vallabh Prakashan, 1994, pp 107-113.
[16] M.N. Ghosh. Fundamentals of Expt. Pharmacology. 2nd ed. Scientific Book Agency: Calcutta, 1984, pp.192-194.
[17] C.A. Winter, E.A. Risley, G.W. Nuss. Carrageenan induced edema in hind paw of the rat as an assay for inflammatory drugs. Proc. Soc. Expt. Biol. Med., 1962, 111: 544-547.
[18] H. Suleyman, L.O. Demirezer, A. Kuruuzum, et al. Antiinflammatory effect of the aqueous extract from Rumex patientia L. roots. J. ethnopharmacol., 1991, 65: 141-148
[19] P.F. D'Arcy, E.M. Howard, P.W. Muggleton, et al. The anti-inflammatory action of griseofulvin in experimental animals. J. Pharm. Pharmacol., 1960, 12: 659-665.
[20] N.B. Eddy, D. Leimback. Synthetic analgesics. II. Dithienylbutenyl and dithienylbutylamines. J. Pharmacol. Exp. Ther., 1953, 107: 385–393.
[21] S. Palanichamy, S. Nagarajan. Analgesic activity of Cassia alata leaf extract and Kaempferol-1,2-O-sophoroside. J. Ethnopharmacol., 1990, 29: 73-78.
[22] R. Koster, M. Anderson, E.J. De Beer. Acetic acid analgesic screen. Federation proceedings, 1959, 18: 412-420.
[23] R. Vinegar, W. Schreiber, R Hugo. Biphasic development of carrageenan oedema in rats. J. Pharmacol. Exp. Ther., 1969, 166(56): 96-103.
[24] D.A. Rowley, E.P. Benditt. J. Expt. Med., 1956, 103: 399-415.
[25] A. Linardi, S.K.P. Costa, G.R. Da silva, et al. Involvement of kinins mast cells and sensory neurons in the plasma exudation and paw oedema induced by staphylococcal entrotoxin-B in the mouse. Eur. J. Pharmacol., 2002, 399: 235-242.
[26] O.H. Lowry, N.J. Rosebrough, A.L. Far, et al. Protein measurement with the Folin phenol reagent. J. Biol. Chem., 1951, 193: 265-275.
[27] J. Castro, H. Sesame, H. Sussman, et al. Life sci. 1968, 129-136.
[28] R.M. Gene, L. Segura, T. Adzet, et al. Heterotheca inuloides: Antiinflammatory and analgesic effects. J. ethnopharmacol., 1998, 60: 157-162.
[29] G.A. Bentley, S.H. Newton, J. Starr. Evidence for an action of morphine and the enkephalins on sensory nerve endings in the mouse peritoneum. Br. J. Pharmacol., 1981, 73: 325-332.
[30] G.A. Bentley, S.H. Newton, J. Starr. Studies on the antinociceptive action of agonist drugs and their interaction with opioid mechanisms. Br. J. Pharmacol., 1983, 79: 125-134.
[31] E.B. Mehmet. Antiinflammatory and antinociceptive properties of Dantroline sodium in rats and mice. Pharmacol. Res., 2002, 45: 455-460.
[32] C.V. Oddis. New perspectives on osteoarthritis. Am. J. Med., 1996, 100: 10-15.
[33] P. Saha, U.K. Mazumder, P.K. Haldar, et al. Antioxidant and Hepatoprotective Activity of Lagenaria siceraria aerial parts. Pharmacog. J., 2011, 3(23): 67-74.

Table.1. Effect of methanol extract of aerial parts of *L. siceraria* (MELS) on carrageenan induced rat hind paw oedema

Groups	Mean Paw oedema (% Inhibition)			
	1h	2h	3h	4h
Control (2%Tween 80)	0.58±0.03	0.60±0.05	0.68±0.06	0.70±0.08
MELS (200mg/kg)	0.52±0.06 (10.35)	0.53±0.03 (11.67)	0.49±0.02[*] (27.94)	0.47±0.06[*] (32.86)
MELS (400mg/kg)	0.44±0.07[*] (24.14)	0.46±0.03[*] (23.33)	0.43±0.09[*] (36.77)	0.38±0.02[*] (45.71)
Indomethacin (10 mg/kg)	0.48±0.06[*] (17.24)	0.43±0.07[*] (28.33)	0.39±0.05[*] (42.65)	0.40±0.05[*] (42.86)

Values are mean ± S.E.M.; n=6; [*] $p<0.05$, when compared to control group animals

Table.2. Effect of methanol extract of aerial parts of *L. siceraria* (MELS) on dextran induced rat hind paw oedema

Groups	Mean Paw oedema (% Inhibition)			
	1h	2h	3h	4h
Control (2% Tween 80)	0.48±0.05	0.47±0.05	0.51±0.06	0.48±0.04
MELS (200mg/kg)	0.41±0.07 (14.58)	0.37±0.05 (21.28)	0.32±0.09 (37.26)	0.30±0.01[*] (37.50)
MELS (400mg/kg)	0.36±0.03[*] (25.00)	0.33±0.03[*] (29.79)	0.30±0.05[*] (41.18)	0.25±0.03[*] (47.92)
Indomethacin (10 mg/kg)	0.33±0.06[*] (31.25)	0.27±0.04[*] (42.55)	0.25±0.08[*] (50.98)	0.23±0.04[*] (52.08)

Values are mean ± S.E.M.; n=6; [*] $p<0.05$, when compared to control group animals

Table.3. Effect of methanol extract of aerial parts of *L. siceraria* (MELS) on histamine induced rat hind paw oedema

Groups	Mean Paw oedema (% Inhibition)			
	1h	2h	3h	4h
Control (2% Tween 80)	0.54±0.06	0.56±0.05	0.57±0.04	0.58±0.04
MELS (200mg/kg)	0.45±0.05 (16.67)	0.41±0.03[*] (26.79)	0.40±0.04[*] (29.83)	0.38±0.05 (34.48)
MELS (400mg/kg)	0.38±0.03[*] (29.63)	0.33±0.03[*] (41.07)	0.31±0.05[*] (45.61)	0.29±0.03[*] (50.00)
Indomethacin (10 mg/kg)	0.42±0.03[*] (22.22)	0.37±0.04[*] (33.93)	0.32±0.05[*] (43.86)	0.30±0.03[*] (48.27)

Values are mean ± S.E.M.; n=6; [*] $p<0.05$, when compared to control group animals

Table.4. Effect of methanol extract of aerial parts of *L. siceraria* (MELS) on cotton pellet induced granuloma in rats

Groups	Weight (dry) of cotton pellets (mg)	% Inhibition
Control (2% Tween 80)	36.45±2.65	-
MELS (200mg/kg)	33.00±1.56	9.47
MELS (400mg/kg)	21.05±1.33*	42.25
Indomethacin (10 mg/kg)	20.80±1.54*	42.94

Values are mean ± S.E.M.; n=6; *$p<0.05$, when compared to control group animals.

Table.5. Antinociceptive effect of methanol extract of aerial parts of *L. siceraria* (MELS) on the latency of mice exposed to hot plate

Groups	Latency (s)					
	0 min	30 min	60 min	90 min	120 min	150 min
Control (Tween80)	6.38±0.67	6.44±0.74	6.01±0.35	5.96±0.78	5.52±0.88	6.52±0.58
MELS (200mg/kg)	6.40±0.18	8.70±1.06	11.94±0.70*	10.84±0.98*	9.35±0.58*	8.90±1.25
MELS (400mg/kg)	6.39±0.80	9.50±0.50*	13.12±0.68*	12.98±0.96*	10.88±0.66*	10.00±0.95*
Pentazocin (5 mg/kg)	6.40±0.20	9.95±0.63*	12.98±0.34*	14.55±0.50*	13.04±0.95*	11.90±0.74*

Values are mean ± S.E.M.; n=6; *$p<0.05$, when compared to control group animals

Table.6. Antinociceptive effect of methanol extract of aerial parts of *L. siceraria* (MELS) on the tail immersion test of mice

Groups	Tail withdrawal time (s)					
	0 min	30 min	60 min	90 min	120 min	150 min
Control (2% Tween 80)	2.90±0.34	2.80±0.60	2.30±0.45	2.50±0.33	2.60±0.80	2.40±0.33
MELS (200mg/kg)	2.33±0.60	4.80±1.30	5.85±0.50*	6.30±0.21*	5.40±1.40	4.77±0.90
MELS (400mg/kg)	2.81±0.33	5.98±0.48*	7.00±0.25*	6.70±0.30*	6.18±0.13*	5.90±0.31*
Pentazocin (5 mg/kg)	2.83±0.40	5.90±0.45*	6.90±0.50*	7.80±0.33*	7.50±0.40*	6.90±0.60*

Values are mean ± S.E.M.; n=6; *$p<0.05$, when compared to control group animals

Table.7.Antinociceptive effect of methanol extract of aerial parts of *L. siceraria* (MELS) on acetic acid induced writhing in mice

Groups	Number of Writhing	% Inhibition
Control (2% Tween 80)	26.70±1.40	-
MELS (200mg/kg)	19.50±1.00*	26.97
MELS (400mg/kg)	10.88±1.10*	59.25
Indomethacin (10 mg/kg)	9.90±1.50*	62.92

Values are mean ± S.E.M.; n=6; *$p<0.05$, when compared to control group animals

Article

In Silico Exploration for New Antimalarials: Arylsulfonyloxy Acetimidamides as Prospective Agents

Saroj Verma,[†] Utsab Debnath,[†] Pooja Agarwal,[‡] Kumkum Srivastava,[‡] and Yenamandra S. Prabhakar*,[†]

[†]Medicinal and Process Chemistry Division, [‡]Parasitology Division, CSIR-Central Drug Research Institute, Jankipuram Extension, Lucknow-226 031, India

Ⓢ Supporting Information

ABSTRACT: A strategy is described to identify new antimalarial agents to overcome the drug resistance and/or failure issues through in silico screening of multiple biological targets. As a part of this, three enzymes namely CTPS, CK, and GST were selected, from among 56 drug targets of *P. falciparum*, and used them in virtual screening of ZINC database entries which led to the design and synthesis of arylsulfonyloxy acetimidamides as their consensus inhibitors. From these, two compounds showed good activity against sensitive (3D7; IC$_{50}$, 1.10 and 1.45 μM) and resistant (K1; IC$_{50}$, 2.10 and 2.13 μM) strains of the parasite, and they were further investigated through docking and molecular dynamics simulations. The findings of this study collectively paved the way for arylsulfonyloxy acetimidamides as a new class of antimalarial agents.
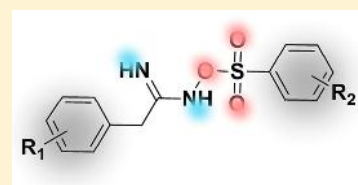
1. INTRODUCTION

Worldwide malaria maps with poverty. This protozoan infection is a leading cause of morbidity and mortality in tropical and subtropical regions. Globally it alone causes a disease burden of about 200 million infections and more than 500 000 deaths annually.[1] Different Plasmodium species which include *P. falciparum*, *P. malariae*, *P. vivax*, and *P. ovale* are the causative agents. Among these, *P. falciparum* (*Pf*) is the most lethal and widely spread in human beings. Its clinical management depends on several drugs.[2] They include chloroquine (CQ), mefloquine, atovaquone, proguanil, sulphadoxine—pyrimethamine combination, artemisinins, artemisinin combination therapy, etc. Apart from the foregoing, some widely tried procedures for discovering fresh leads/drugs against this parasite include screening of diverse chemicals, new combinations of two (or more) existing drugs to act on same or different enzyme targets and strategies to counter the drug resistance.[2−4] In the face of these interventional measures malarial parasite, with impunity, has managed to keep the drugs at bay in controlling its rise and transmission.[2] The treatment failures are often attributed to a multitude of reasons which include mutation of targeted enzyme(s), amplification of parasite's transport proteins in pumping out or expelling the drug(s), and/or opening up of alternative biochemical/metabolic paths in the organism for its survival.[5,6] The situation calls for rethinking and conceptualization of strategies to interfere with the deep-seated pathways of the parasite to restrain its resurgence and control it with little scope for the emergence of drug-resistant strains. In this outset, exploring the parasite's biological machinery for hitherto unexplored biochemical pathways may open up fresh and tactical avenues for new chemicals to combat the malaria.

The therapeutic strategies aiming at single biological target (of the pathogen) with limited or closely related chemical entities are often attributed to be a leading cause for the drug failure and/or emergence of drug resistant strains of pathogens.[5,6] Among the

feasible options to deal with the situation, the strategies mulling over "multiple drugs against single or multiple targets" (or combination therapy)[2] and "single drug against multiple targets"[3,4] are the notable ones. While the former one is fairly explored in the chemotherapy of infectious diseases with limited success, the later one holds promise for exploration. The main causative agent of human malaria, *P. falciparum*, with its 14 chromosomes encodes more than five thousand proteins.[7] It is a huge reservoir to explore all probable targets of antimalarial drugs. Even though every organism tanks large number of enzymes and proteins as part of its biochemical machinery, its survival and sustenance depends on the function of a few key ones in the regulatory network. In this backdrop a computational approach is contemplated to identify multiple enzymes to design single consensus chemical entity (CCE) as their inhibitors/modulators to overcome the treatment failure and emergence of drug resistance in malaria.

Some connectedness among possible drug targets together with their functional importance in biochemical/metabolic paths may offer scope for the selection of potential enzymes and thereby the design of CCEs as their inhibitors/modulators. The concept is explored through a distance matrix approach by identifying three key enzymes of the parasite which have vital functions in the biochemical/metabolic network. This has resulted in cytidine triphosphate synthetase (CTP synthetase or CTPS),[8] choline kinase (CK),[9] and glutathione S-transferase (GST)[10] as potential enzymes for exploring the concept of a single drug against multiple targets or CCE. Furthermore, the pathways of these enzymes, as indicated in Brenda enzyme database, suggested their significance to the parasite's sustenance.[11] They are used in virtual screening of ZINC database entries[12] to identify the CCEs. This has led to

arylsulfonyloxy acetimidamides as model compounds for synthesis and biological evaluation. Some of these compounds showed encouraging activity against *P. falciparum* (3D7, K1). The most active compound from these is further studied through docking[13,14] and molecular dynamic (MD) simulations[15] to shed some light on possible molecular interactions with the selected enzymes. The details are discussed here.

2. MATERIALS AND METHODS

2.1. Enzyme Database. The study has involved fifty-six drug targets of *P. falciparum* reported in recent literature (Table 1). The availability of primary structures (FASTA sequences) and a precedence/proposal for them as probable drug targets was the criteria for the consideration of these enzymes. It is assumed that from among these enzymes, the "connected and proximately placed" ones give scope to design a CCE to modulate their activity. Thus, we formulated a strategy, akin to phylogenic

Table 1. *P. falciparum* Enzymes Considered in the Exploration

S. no.	targets[a]	S. no.	targets[a]
1	cytochrome c oxidase	29	farnesyltransferase
2	1-deoxy-D-xylulose 5-phosphate reducto-isomerase	30	glutathione S-transferase
3	deoxyhypusine synthase	31	β-ketoacyl-ACP synthase
4	dihydrofolate reductase	32	N-myristoyltransferase
5	dihydroorotate dehydrogenase	33	cholinephosphate cytidylyltransferase
6	enoyl-ACP-reductase	34	hypoxanthine guanine phospho ribosyl-transferase
7	ferredoxin NADP reductase	35	choline kinase
8	glutamate dehydrogenase	36	dihydropteroate synthase
9	glutathione reductase	37	hexokinase
10	lactate dehydrogenase	38	homospermidine synthase
11	ubiquinol-cytochrome-c reductase	39	S-adenosylmethionine synthetase
12	ribonucleotide reductase	40	aspartate carbamoyltransferase
13	succinate dehydrogenase	41	1-deoxy-D-xylulose-5-phosphate synthase
14	thioredoxin reductase	42	purine nucleoside phosphorylase
15	DNA gyrase	43	plasmepsin I
16	peptidyl-prolyl *cis–trans* isomerase	44	plasmepsin II
17	topoisomerase I	45	sphingomyelinase
18	topoisomerase II	46	adenosine deaminase
19	triose phosphate isomerase	47	histone deacetylases
20	adenylosuccinate lyase	48	S-adenosyl-L-homocysteine
21	β-hydroxyacyl-ACP dehydratase	49	peptide deformylase
22	chorismate synthase	50	helicase
23	DNA-(apurinic/apyrimidinic site) lyase	51	dihydroorotase
24	fructose 1,6 biphosphate aldolase	52	acyl-CoA synthetase
25	2-C-methyl-D-erythritol-2,4-cyclodiphosphate synthase	53	CTP synthase
26	orotate phosphoribosyltransferase	54	carbamoyl phosphate synthetase
27	RNA polymerase	55	dihydrofolate synthase
28	DNA polymerase	56	acetyl-CoA carboxylase Ligase

[a]The enzymes listed under serial numbers 1−14 are oxidoreductases (Ox), 15−19 are isomerases (Is), 20−25 are lyases (Ly), 26−42 are transferases (Tr), 43−51 are hydrolases (Hy), and 52−56 are ligases (Li). Complete bibliographic details are provided in the Supporting Information.

analysis, for the selection of three enzymes from among the considered targets by a distance matrix approach and by examination of their functional roles in the metabolic pathways.

2.2. Selection of Target Enzymes. The study has proceeded with segregation of all the targets into six distinct enzyme classes (Table 1). The FASTA sequences of all the targets were retrieved from NCBI and UniProt. The BLAST (Basic Local Alignment Search Tool) analysis of FASTA sequences of all targets was carried out to identify the connectedness and proximity of the targets. The sequence similarity of each target was determined against all others in terms of e-values. These were used to compute the total distance (TD) and average distance (AD) of targets, between different classes (*inter*; BC) as well as within each class (*intra*; C), as described below.

$$\text{TD}_{BC} = \sum e_{i,j}$$

$$\text{AD}_{BC} = \sum e_{i,j}/(nm)$$

where, TD_{BC} is between classes total distance, AD_{BC} is between classes average distance, $e_{i,j}$ is the e-value between target i ($i = 1-n$; n is total targets in p-class) of p-class and target j ($j = 1-m$; m is total targets in q-class) of q-class.

$$\text{TD}_C = \sum e_{i,j}$$

$$\text{AD}_C = \sum e_{i,j}/((n^2 - n)/2)$$

where, TD_C is within class total distance, AD_C is within class average distance, $e_{i,j}$ is the e-value between targets i and j with i varying from 1 to n and j varying from $i + 1$ to n; n is the total targets in the class.

In the first iteration, the enzyme class with smallest average in-between class distances (AD_{BC}) was considered and assigned as closely placed to all others (complete data is provided as part of the Supporting Information). The first enzyme of intended multiple targets was selected from among the members of this class using the within class distances as well as its relevance in the metabolic pathway for the parasite's survival and sustenance. In the second iteration, the first target was taken as reference to compute the distances of remaining classes from it and the class which is closely placed to it was considered for further analysis. In view of the importance of "cleaning up" or "detoxification" processes in parasite milieu, *P. falciparum* glutathione S-transferase (GST) is adopted as third enzyme of the intended multiple targets for inhibition/modulation.

2.3. Structural Modeling. The FASTA sequence of target protein was retrieved from the NCBI database and its primary properties were assessed using different servers.[16,17] The template protein structure(s) consensus to target sequence was searched from the protein data bank with PSI-BLAST,[18] PHYRE[19] and JPred3[20] under default parameter settings. The templates showing low e-value and high sequence identity with the target sequence were selected as model template(s). The alignment of target sequence with the template was done using Modeler 9.10.[21] On alignment the disordered regions of target were checked in DisEMBL.[22] Giving due consideration to the conserved motifs, the disordered regions of the aligned target was rectified in Bio-Editor[23,24] by editing the sequence to minimize the gaps/insertions. The "rectified" target sequence was realigned with the template in Modeler 9.10 to generate the initial models. The model(s) was assessed for the stereochemical quality scores which include DOPE score, MOLPDF, GA341

Table 2. Average Distance of Enzyme Classes Based on the _e_-Values between Targets of _P. falciparum_[a]

enzyme class	oxidoreductase	isomerase	lyase	transferase	hydrolase	ligase
oxidoreductase	2.56					
isomerase	2.95	3.40				
lyase	2.89	2.71	1.47			
transferase	2.32	2.61	2.18	2.25		
hydrolase	2.40	2.67	2.46	2.09	2.60	
ligase	2.18	2.51	2.30	1.86	1.86	1.11

[a]All enzymes and corresponding data are provided in the Supporting Information.

score, Ramachandran plot, Errat plot, and Prosa plot, and the best scored one was selected for refinement.[21,25,26] This was further refined for relieving steric clashes and improper contacts by energy minimization using GROMOS96 force field[27] in Swiss PDB viewer 4.0.1,[28] followed by iterative loop refinement in Modeler 9.10 (ERRAT plot showing confidence limits to reject residue regions that exceed ≥95%) to give the homology model of the target. Followed by this, the active site(s) (binding pocket) of selected targets were identified with due consideration to the bound ligands of template protein(s) and the conserved domain by involving the CASTp (Computed Atlas of Surface Topology of Proteins), Site-finder of MOE, and protomol of SYBYLX 1.3.

2.4. Molecular Dynamics (MD) Simulations. In NAMD2.7[15] MD simulations were carried out on the homology model to obtain equilibrated protein structure. This was done under periodic boundary conditions using the solvated (water box) protein by applying appropriate force field, constant molecular number, pressure (1 atm), temperature (310 K; NPT), cut-offs for nonbonded atom interactions (12 Å), and Particle mesh Ewald (PME) algorithm for long-range electrostatic forces between the atoms. The system (protein in water box) was adequately minimized followed by equilibrated for enough length of time. The integration time step of dynamics was set to 2 fs, and the trajectories were collected at regular intervals. The results were analyzed and protein stability was assessed in VMD 1.91 (Visual molecular dynamics),[29] VEGAZZ,[30] and Video match[31] by computing different parameters which include, energies, radius of gyration, and root-mean-square deviation (RMSD) of the trajectories. Furthermore, the MD simulations were also suitably carried out on the selected enzymes and CCE complexes to study the stability of these systems and dynamics of molecular interactions between them.

2.5. Virtual Screening. From ZINC database, using the structural similarity between its entries and the known substrates/inhibitors of _Pf_-CTPS, CK, and GST, 8635 molecules were identified for virtual screening. The identified molecules were screened against the selected targets in the Surflex-Dock Geomax (SFXC) module of Sybyl-X 1.3.[13] The corresponding proteins were prepared following the default procedure set in the module by applying the Gasteiger–Huckel charges and subjected to staged energy minimization using Tripos force field. The residue based protomols (binding pockets) were generated from the prepared proteins for the docking experiments. The screening of the identified molecules was done by successively docking them into the generated binding pockets. The affinities of the molecules to the respective enzymes were analyzed using crash, polar, and total scores obtained from the docking experiments.

2.6. Synthesis. The arylsulfonyloxy acetimidamides, the designed common inhibitors of three targets, are prepared using the following synthetic scheme.[32]

2.6.1. Synthesis of N′-Hydroxy-2-arylacetimidamides (2). Hydroxylamine hydrochloride (2.4 mmol) was dissolved in methanol. Methanolic sodium methoxide (2.5 mmol) was added to this solution and refluxed for 30 min. 4-Substituted benzeneacetonitraile (2 mmol) (1) was added to this solution and further refluxed the contents for 12 hours to yield corresponding N′-hydroxy-2-arylacetimidamide (2). The progress of the reaction was monitored by TLC (10% MeOH/CHCl₃). On completion of the reaction, methanol was evaporated by rota vapor under reduced pressure. The residue was dissolved in dichloromethane and washed with brine. The organic layer was collected and dried with anhydrous sodium sulfate to obtain crude compound 2 (yield 75−79%). This was further purified through column chromatography and the structure of N′-hydroxy-2-arylacetimidamide (2) was confirmed by analyzing NMR and mass spectra.

2.6.2. Synthesis of Arylsulfonyloxy Acetimidamides (3). In a round-bottom flask to 30 mL dichloromethane, 1 mmol of compound 2 followed by 1.2 mmol triethayl amine were added and the solution was cooled to 0 °C. To this, 1.2 mmol arylsulphonyl chloride was added with constant stirring. The stirring of reaction mixture was continued for 1−2 h to complete the sulfonylation of 2 to afford corresponding arylsulfonyloxy acetimidamide (3). The completion of reaction was monitored through TLC (40% EtOAc/hexane). On completion of reaction, the mixture was washed with brine and dried with anhydrous sodium sulfate followed by evaporated dichloromethane under reduced pressure to obtain crude arylsulfonyloxy acetimidamide (3) (yield 70−85%). This was further purified through column chromatography and the structure of arylsulfonyloxy acetimidamide (3) was confirmed by analyzing ¹H NMR, ¹³C, ES-MS, and HRMS spectra.

2.7. Biological Screening. The synthesized compounds were evaluated for antimalarial activity against 3D7 (CQ-sensitive) and K1 (CQ-resistant) strains of _P. falciparum_ using Malaria SYBR Green I nucleic acid staining dye based fluorescence (MSF) assay as mentioned by Singh et al.[33] The stock (10 mM) solution was prepared in DMSO and test dilutions were prepared in culture medium (RPMI-1640-FBS). Chloroquine-diphosphate (SIGMA) was used as reference drug. Briefly the procedures are described below.

2.7.1. Antimalarial Assay. 50 μL of culture medium was dispensed in 96 well plate followed by addition of 50 μL of highest concentration (in subsequent screens with 2-fold serial dilutions) of test compounds (in duplicate wells) in row B. Following this, 50 μL of 2.0% parasitized cell suspension containing 0.8% parasitaemia (Asynchronous culture containing more than 80% ring stages) was added to each well except four wells in row "A" which received matching volume of non parasitized erythrocyte suspension. The plates were incubated at 37 °C in CO₂ incubator in an atmosphere of air mixture with 5% CO₂ for 72 h. Following this 100 μL of lysis buffer containing 2×

concentration of SYBR Green-I (Invitrogen) was added to each well and the plates were incubated for one more hour at 37 °C. The plates were examined at 485 ± 20 nm (excitation) and 530 ± 20 nm (emission) for relative fluorescence units (RFUs) per well using the fluorescence plate reader (FLX800, BIOTEK). The IC_{50} values were obtained by Logit regression analysis of dose response curves using a preprogrammed Excel spreadsheet.

2.7.2. Cytotoxicity Assay. Cytotoxicity of the compounds was determined using Vero cell line (C1008; Monkey kidney fibroblast) following the method as mentioned in the work of Sharma et al.[34] The cells were incubated with compound-dilutions for 72 h and MTT (SIGMA) was used as reagent for detection of cytotoxicity. Podophyllotoxin (SIGMA) was used as the reference drug. The 50% cytotoxicity concentration (CC_{50}) was determined using nonlinear regression analysis of dose response curves using a preprogrammed Excel spreadsheet.

3. RESULTS AND DISCUSSION

3.1. Target Selection. The average in-between class distances of six distinct enzyme classes comprising fifty-six drug targets of *P. falciparum* are shown in Table 2 (Figure 1).
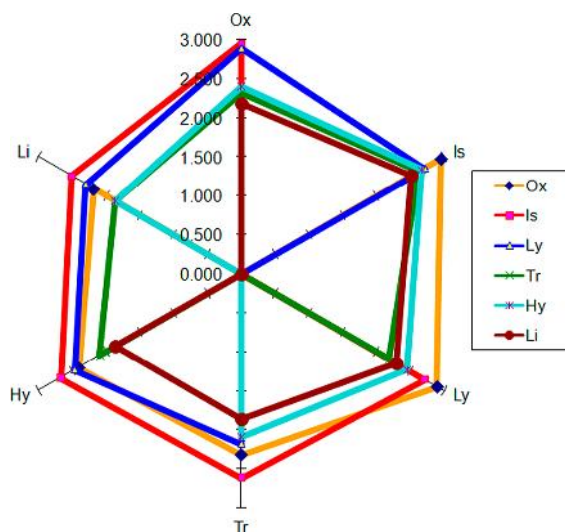
Figure 1. Interclass distances (*e*-value) of *P. falciparum* targets.

This clearly showed that ligase is "closely" placed to all other classes ($\sum AD_{BC} = 10.70$). This class has five enzymes in it. The within class distances of each enzyme with all other targets led to CTP synthase (CTPS) as closely placed one to remaining members of this class. In the parasite's metabolic pathway, CTPS is involved in the synthesis of CTP, a high-energy molecule like ATP. The parasite uses CTP in the synthesis of glycerophospholipids and glycosylation of proteins and as a substrate in RNA synthesis. In view of this, CTPS has been selected as one of the three intended targets for inhibition/modulation.

For the selection of next target, CTPS has been taken as the focal point to compute the distances between CTPS and remaining five enzyme classes. Herein, the transferases have emerged as close to CTPS. This enzyme class has 17 targets in it. The search for second enzyme in this class in conjunction with CTPS has led to choline kinase (CK) as potential target. In the parasite CK facilitates the biosynthesis of phospholipid (PL) through the phosphorylation of choline. In the metabolic pathway by making use of CTP, choline monophosphate gets converted into corresponding diphosphate nucleotides (CDP-

choline) followed by to phosphatidylcholine. Interestingly, for the parasite ethanolamine kinase (EK) is another enzyme in its pathway for the production of phosphatidylethanolamine via CTP.

For all organisms/living systems, cleaning up or detoxification of its milieu is an important task. In the parasite, glutathione S-transferase (GST) is one enzyme involved in the detoxification process via ceramide. As a part of downstream regulation of events sphingomyelin synthase (SS) oversees the formation of sphingomyelin from ceramide and phosphatidylcholine (from CK/CTPS pathway) and pave the way for detoxification/apoptosis signaling in the parasite. In the process, parasite's GST facilitates the glutathione-toxin (ceramide/xenobiotics) adduct formation and helps in detoxification of the milieu. Thus, inhibition of GST may help in the retention of ceramide/xenobiotic substances thereby make the parasite milieu toxic. Considering this we have adopted parasite's GST as third enzyme of the intended multiple targets for inhibition. The interconnections between the biochemical pathways of selected enzymes are shown in Figure 2, thus justifying them as possible targets against malaria.

3.2. *Pf*-CTPS Homology Model. In the absence of the 3D structure of *Pf*-CTPS, its homology model has been developed from the FASTA sequence (860 residues) with accession code AAC36385 retrieved from the NCBI database.[8] It is a 98.85 kDa protein with isoelectric point 6.381. Its secondary structure membrane topology showed that the residues are distributed in the cytoplasmic (1−520), transmembrane (521−539), and extra-cyoplasmic (540−860) regions. It has two substrate binding domains namely synthetase domain in vicinity of N-terminal and glutaminase domain in vicinity of C-terminal. Using the glutaminase domain, *Pf*-CTPS transforms uridine-5'-triphosphate (UTP) into cytidine triphosphate (CTP).

A standard search of protein data bank with the *Pf*-CTPS FASTA sequence led to the X-ray structures of CTPS from *sulfolobus solfataricus* (PDB code: 3NVA; number of residues, 535; *e*-value, 7.00×10^{-107}; sequence identity, 39%)[35] and *Thermus thermophilus* (PDB code: 1VCO; number of residues, 550; *e*-value, 9.00×10^{-102}; sequence identity, 36%)[36] as best consensus templates for its homology modeling. A further examination of *Pf*-CTPS sequence in PHYRE, a fold recognition method, suggested 3NVA as best suited template for the structural modeling of this protein. In Modeler 9.10 the alignment of target FASTA sequence with the 3NVA template followed by the editing of undefined portions with due care for the conserved regions and on iterative refinement led to the optimized homology model of *Pf*-CTPS (Figure 3). We also made attempts to model the *Pf*-CTPS using 3NVA, 1VCO, and other pdb templates, through multiple sequence alignment; however, they did not give any better results than using 3NVA alone. In this scenario, we carried out the further study using the *Pf*-CTPS model generated from 3NVA. The model is further refined through MD simulations for 5 ns. The structure has reached an equilibrium conformation approximately after 0.75 ns of dynamics simulations. The last frame has shown RMSD 4.87 Å (for frames from 0.75 to 5 ns, average RMSD ± SD is 4.39 ± 0.28 Å). On reaching equilibrium, the model has retained its shape without much change in its structure (Figure 3).

3.3. Target Sites. In *Pf*-CTPS, as the glutaminase domain is important for the transformation of UTP into CTP, in the model it is determined by making use of glutamine bound X-ray cocrystal of CTPS (PDB code 1VCO) of *Thermus thermophilus* HB8 together with 3NVA in multiple sequence alignment
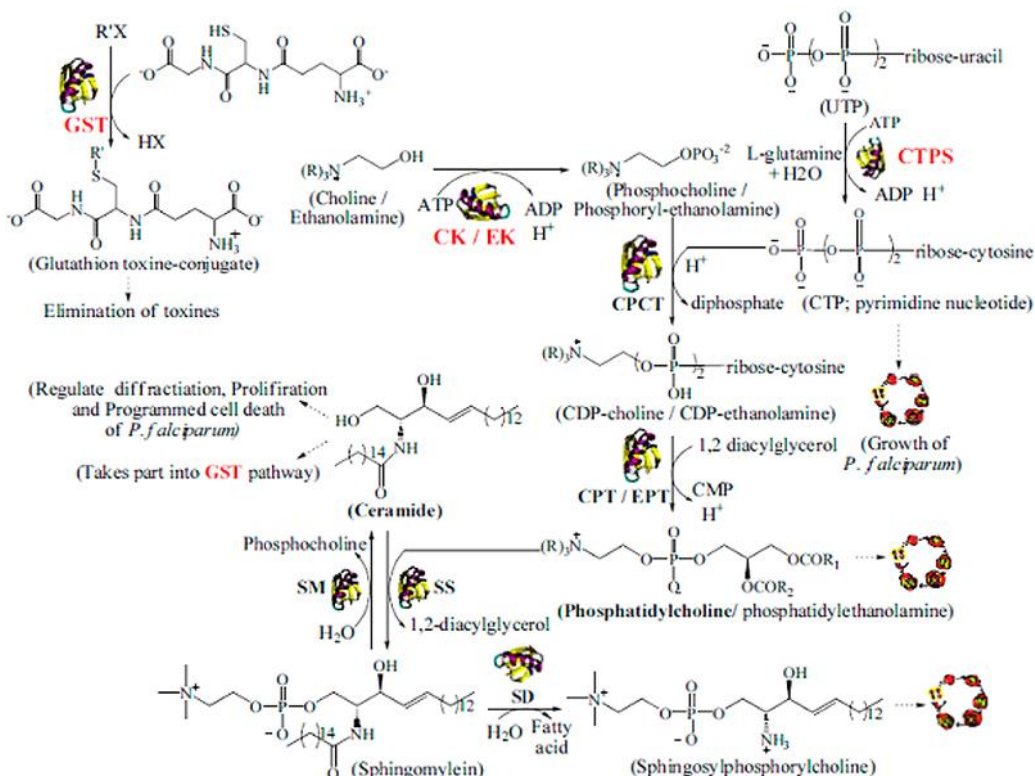
Figure 2. Interconnections between the pathways of CTPS, CK, and GST of *P. falciparum* (CDP, cytidine diphosphate; CMP, cytidine monophosphate; CPCT, choline-phosphate cytidyltransferase; EPCT, ethanolamine-phosphate cytidyltransferase; CPT, cholinephosphotransferase; EPT, ethanolamine phosphotransferase; SS, sphingomyelin synthase; SM, sphingomyelinase; SD, sphingomyelin deacylase).
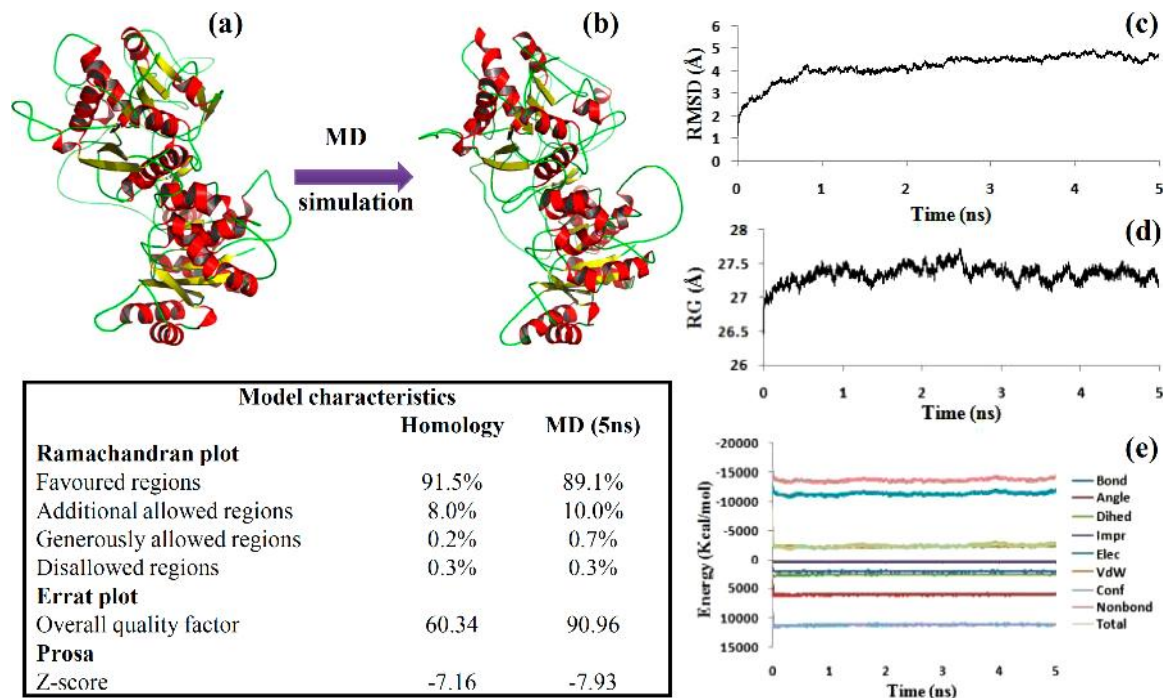
Figure 3. (a) 3D structure of *Pf*-CTPS materialized from CTPS template 3NVA through homology modeling; (**b**) homology model of *Pf*-CTPS at the end of 5 ns molecular dynamics simulations in NAMD; (**c**−**e**) RMSD, radius of gyration, and different components of molecular energy profiles of *Pf*-CTPS trajectories, respectively. The data in the box shows some formal characteristics of *Pf*-CTPS model as developed from homology modeling procedure and after subjecting it to 5 ns MD simulations.

method. This has led to the *Pf*-CTPS's glutaminase site as composed of residues TYR54, GLY384, GLY385, PHE386, CYS412, LEU413, GLN416, GLU435, ARG583, HIS584, ARG585, TYR586, and HIS631.[36] These residues are part of conserved ones in CTPS enzyme from different species. Among these, LEU413, GLU416, GLY385, PHE386, GLU435, and

ARG585 are key residues for interaction with glutamine. Furthermore, the residues MET51 to GLY67 of loop region are part of the gateway for the transfer of ammonia released from the glutaminase domain to the synthetase domain.[36] The results from CASTp, Site-finder of MOE, and protomol of SYBYLX 1.3 also supported the identified pocket.[37,38]

The target sites of remaining two enzymes CK and GST are adopted from their enzyme−ligand cocrystal structure PDB codes 3FI8 and 2AAW, respectively.[39,40] However, the reported 3D structure of CK has gaps at several places. For the purpose of MD simulations the structure is rectified by appropriate modeling techniques. The CK target site residue numbers in the original pdb and rectified pdb are ASP288 (210, residue number in rectified pdb), GLN290 (212), ASP305 (227), GLU307 (229), TYR308 (230), GLU324 (246), TYR329 (251), TRP392 (314), TRP395 (317), TYR414 (336), and ARG418 (340). The GST target site is mainly composed of residues TYR9, GLY14, LYS15, PHE45, GLN58, VAL59, PRO60, GLN71, SER72, GLN104, HIS107, ASN111, PHE116, and TYR211. In CK, among the identified residues, ASP210 and GLN212 play important role in binding the substrate, whereas in GST, the residues TYR9, LYS15, and GLN71 are important for glutathione binding. These target sites are used in virtual screening to identify the CCEs.

3.4. Virtual Screening. In order to acquire the chemical entities for virtual screening (VS) the substrates/inhibitors of the three enzymes were used as query molecules to filter the matching structures from ZINC database. Here, glutamine and 6-diazo-5-oxo-L-norleucine (DON) of CTPS, choline, N-[2-[[3-(4-bromophenyl)-2-propenyl]amino]ethyl]-5-isoquinoline-sulfonamide (H89), and 2-amino-1-butanol of CK, and glutathione, 1-amino-4-{[4-({4-chloro-6-[(2-sulfophenyl)-amino]1,3,5-triazin-2-yl}amino)-3-sulfophenyl]amino}-9,10-dioxo-9,10-dihydro-2-anthracenesulfonic acid of GST were used as query molecules (Figure 4).[41−44] The filtering of the ZINC database entries for the VS structures is carried out in conjunction with query molecules (Figure 4) by using the substructure based similarity and "tight filtering" with 50% similarity as search criteria. This has resulted in 8635 molecules for virtual screening (details are in the Supporting Information).
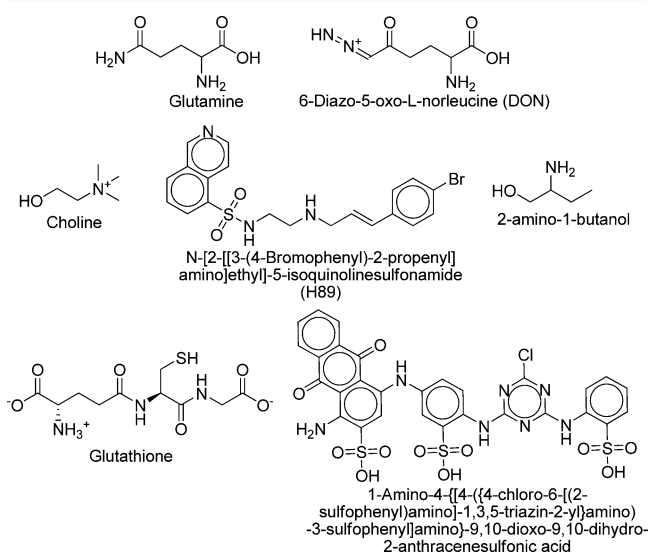
Figure 4. Query structures used in acquiring the ZINC database entries for virtual screening.

In Surflex-Dock using default settings all these 8635 molecules were screened by docking them in to each target site. For every molecule the best docked pose (for each target) is selected based on its total dock score with due consideration to crash and polar scores. For simplicity only one dock pose, corresponding to maximum total dock score, per molecule is considered. The molecules' total dock scores for each enzyme were analyzed, in conjunction with the total dock scores from remaining two enzymes, by successively arranging them in descending order to identify the chemical entities consensus to all three enzymes. This has led to several ZINC database entries bearing substructures of aryl sulfonamide, aryl sulfonate, aryl acetamide (molecular weight spread 313−470), and peptidomimetics (molecular weight ∼600+) containing glutamine, alanine and/ or cysteine moieties, and combinations thereof as agreeable with consensus docking scores to the selected enzymes. From among these, the ZINC entries with substructures of aryl sulfonamide, aryl sulfonate, aryl acetamide are considered in view of their relatively simple scaffolds and low molecular weights. Moreover, the molecular weights of these entries are within the limits suggested by Lipinski's rule of five. In most of these molecules OH, SO_3, SO_2, NH_2, NH, and/or CONH functionalities with aryl groups were found to be involved in binding to the target sites. Briefly, the molecular structures of these ZINC entries represent a functionalized core extended by hydrophobic moieties on one or more sides.

Figure 5 shows the interactions and docking scores of selected ZINC database entries. In Pf-CTPS, the SO_2/ SO_3 groups of **ZINC00627448** and **ZINC79315625** showed H-bond with ARG585. In **ZINC49575668**, its SO_2 group showed H-bond with GLY387 of Pf-CTPS. Apart from these the ZINC entries showed H-bonds with MET51, SER52, VAL59, GLY57, GLY385, GLU441, ARG583, and TYR586 through their NH, NH_2, and OH groups. In CK, **ZINC49575668** and **ZINC79315625** interacted with the enzyme through the SO_2/ SO_3 groups by H-bonding with ARG399. In case of **ZINC00627448**, its SO_2 group showed H-bond with GLY114 and ASN117 of the enzyme. The other important residues for H-bonding with NH, NH_2, and OH of ZINC entries are found to be THR116, ASP305, GLN290, GLU307, and TYR308. In GST, the SO_2 group of **ZINC49575668** and **ZINC00627448** showed H-bond with GLN73. In **ZINC79315625**, its SO_3 group showed H-bond with ASP105 of GST. The other key residues for H-bonding with NH, NH_2, and OH of the compounds are found to be LYS15, GLN71, CYS101, and GLN104.

As the ZINC entries selected from the virtual screening are found to interact with the envisaged enzyme targets using their OH, SO_3, SO_2, NH_2, NH, and/or CONH functionalities and aryl moieties, we looked for a scaffold satisfying these features. Also, malaria being an infection prevalent in the lower strata of socio-economic population, its chemotherapy demands compounds from simple and efficient synthetic procedures for exploration. This has led to arylsulfonyloxy acetimidamides, which has high functional similarity with the selected ZINC entries, for exploration. These compounds are easy to synthesize and meet the economic criteria of new drug explorations in malaria chemotherapy.

3.5. Synthesis. The synthesis of target compounds arylsulfonyloxy acetimidamides (**3**) was accomplished using previously reported method.[32] Following Scheme 1, they were synthesized from different 4-substituted benzeneacetonitrailes (**1**). Compound **1** was refluxed with hydroxylamine hydro-chloride dissolved in methonolic sodium methoxide for about 12
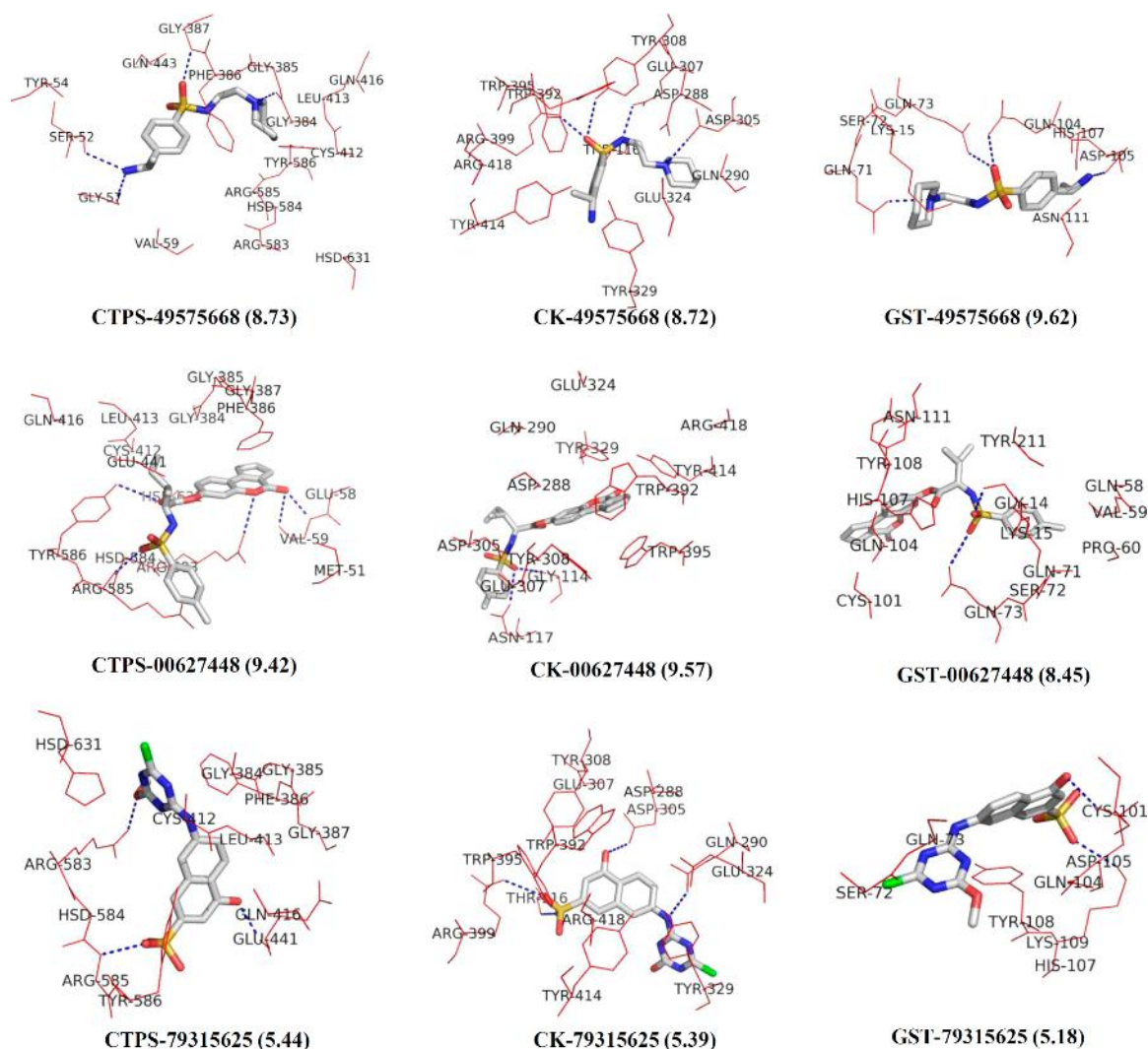
Figure 5. Surflex docked poses of selected ZINC database entries in the target sites of *Pf*-CTPS, CK, and GST with dock scores in parentheses.

Scheme 1. Synthetic Scheme of Arylsulfonyloxy Acetimidamides
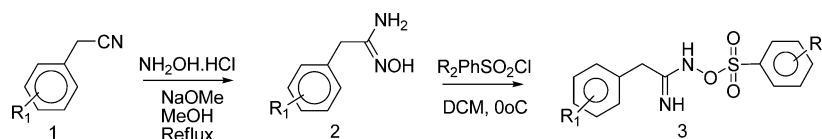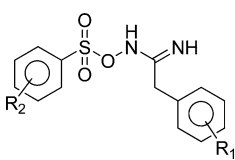
h to yield corresponding *N′*-hydroxy-2-arylacetimidamide (**2**). This in dichloromethane in the presence of triethayl amine on reaction with arylsulphonyl chloride at 0 °C afforded corresponding arylsulfonyloxy acetimidamides (Table 3) in good yield (70−85%). The compounds were purified by column chromatography and the structures were confirmed by analyzing their ^{1}H and ^{13}C NMR, mass, and HRMS spectra.

3.6. In Vitro Antimalarial Activity and Cytotoxicity. All the compounds (Table 3) were tested for their antimalarial activity against 3D7 (CQ-sensitive) and K1 (CQ-resistant) strains of *P. falciparum* and for cytotoxicity in Vero cell line. Among these, four compounds (**3a**, **3d**, **3e**, and **3h**) showed response against sensitive strain (IC$_{50}$, 1.10−4.36 μM) as well as resistant strain (IC$_{50}$, 2.13−4.28 μM) (Table 3). From these, compounds **3a** and **3d** showed IC$_{50}$ values of 1.10 and 1.45 μM, respectively, against sensitive strain. They also respectively showed IC$_{50}$ values of 2.13 and 3.10 μM against the resistant

strain. The remaining two compounds (**3e** and **3h**) showed IC$_{50}$ values of 3.02 and 4.36 μM against sensitive strain and 3.34 and 4.28 μM against resistant strain. For other compounds the IC$_{50}$ values against one or both the strains is above 5.00 μM. Among these, compound **3o** showed activity only against sensitive strain (IC$_{50}$ = 1.69 μM) and compounds **3b** and **3k** showed activity only against resistant strain (IC$_{50}$, 2.13 and 4.51 μM). In Vero cell line none of the compounds showed any cytotoxicity within the prescribed limits of testing concentrations (10 times the IC$_{50}$ values) (Table 3).

Furthermore, the structures of all synthesized compounds were created in Sybyl-X 1.3 and screened in Surflex-Dock by docking them in each target site following the same protocol as implemented in case of ZINC entries. While the compound's response against 3D7 and K1 strains indicate its net in vitro antimalarial activity, the dock scores for *Pf*-CTPS, CK, and GST indicate its affinity for the respective targets. Since the

Table 3. Arylsulfonyloxy Acetimidamides and Their in Vitro Antimalarial Activity, Cytotoxicity, and Surflex-Dock Scores for *Pf*-CTPS, CK, and GST

compd	R1	R2	IC$_{50}$ (μM)[a]		CC$_{50}$[b] (μM)	dock score		
			3D7	K1		CTPS	CK	GST
3a	*p*-Cl	2,4,6-tri-iPr	1.10	2.10	57.20	6.52	9.17	6.93
3b	*p*-Cl	*p*-CH3	>5.00	2.13	34.00	6.21	6.43	5.40
3c	*p*-Cl	*p*-NO$_2$	>5.00	>5.00	157.50	5.18	5.29	4.84
3d	*p*-OCH$_3$	2,4,6-tri-iPr	1.45	3.10	>200	7.71	7.91	7.13
3e	*p*-OCH$_3$	*p*-CH3	3.02	3.34	>200	7.31	6.73	6.45
3f	*p*-OCH$_3$	*p*-NO$_2$	>5.00	>5.00	>200	7.72	5.82	5.62
3g	3,5-di-Cl	2,4,6-tri-iPr	>5.00	>5.00	117.40	7.27	8.51	5.99
3h	3,5-di-Cl	*p*-iPr	4.36	4.28	54.08	5.59	6.88	6.71
3i	3,5-di-Cl	*p*-CH3	>5.00	>5.00	138.70	6.85	5.97	5.72
3j	3,5-di-Cl	*p*-F	>5.00	>5.00	>200	6.07	5.81	5.62
3k	3,5-di-Cl	*p*-I	>5.00	4.51	>200	5.76	5.88	5.57
3l	3,5-di-Cl	H	>5.00	>5.00	77.33	5.00	6.02	6.47
3m	3,5-di-Cl	*p*-NO$_2$	>5.00	>5.00	125.80	6.29	5.65	4.89
3n	3,5-di-Cl	*p*-OCH$_3$	>5.00	>5.00	>200	6.15	6.48	5.65
3o	*p*-F	*p*-CH3	1.69	>5.00	83.98	6.19	7.29	5.75

[a]3D7, chloroquine sensitive strain; K1, chloroquine resistant strain. [b]Vero cell line.
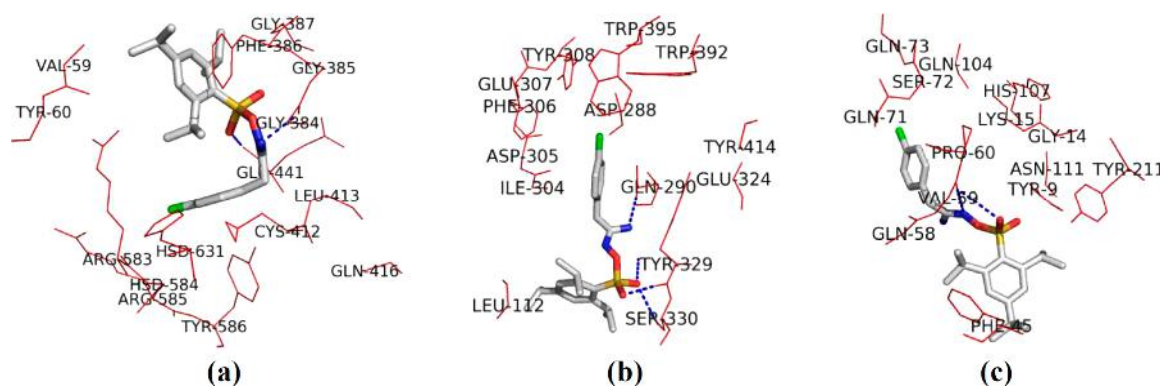
Figure 6. Surflex docked poses of compound **3a** in the target sites of (a) *Pf*-CTPS, (b) CK, and (c) GST.

antimalarial activity of these compounds is expected due to their combined affinity to *Pf*-CTPS, CK, and GST, the cumulative dock scores of these three targets is considered as an index of the in vitro antimalarial activity. The in vitro antimalarial activities of the compounds, excepting **3g**, are in agreement with the cumulative dock scores of the same. On excluding compound **3g**, the correlation between IC$_{50}$ of 3D7 (compounds with IC$_{50}$ > 5.00 are considered as 5.00) and cumulative dock scores of the compounds is 0.69 ($n = 14$, $r^2 = 0.69$); in the case of IC$_{50}$ of K1, it is less but still stands at significant level ($n = 14$, $r^2 = 0.41$). Even though in terms of dock scores compound **3g** appeared very good, in biological test milieu the combination of R1 and R2 groups of this may not be appropriate due to other parameters. Thus, the dock-scores of these compounds with *Pf*-CTPS, CK, and GST are largely in sync with the observed antimalarial activities (Table 3).

Since compound **3a** (Table 3) showed best activity, its docking interactions are analyzed further. Figure 6 shows the docked poses (Surflex) of compound **3a** in the target sites of *Pf*-CTPS, CK, and GST. In *Pf*-CTPS, it has formed H-bonds with the

residues GLY384 and GLU441 through its =NH and =O of SO$_3$ moieties, respectively (Figure 6a). In the case of CK, the compound's =O (of SO$_3$) group formed H-bonds with ASN292, TYR329, and SER330 and the =NH group formed H-bond with GLN290 (Figure 6b). In the target site of GST, the =O of SO$_3$ and NH of compound **3a** showed H-bond interaction with VAL59 (Figure 6c). In spite of best efforts we could not procure/find economical commercial source of selected enzymes; therefore, the compounds could not be tested against them.

3.7. Structure–Activity Relations. The structure–activity profile of the compounds (Table 3) are examined by using the hydrophobicity (π), molar refractivity (MR), and electronic properties (polarity F, resonance R, and Hammett's sigma constant σ_p) of R1 and R2 substituent groups (data provided in the Supporting Information).[45] As the number of compounds with definite activity are limited, the inferences are deduced by comparing molecular pairs sharing common substituent features. The structure–activity profile of these compounds (Table 3) indicate that para-substitution on both the aryl moieties is critical
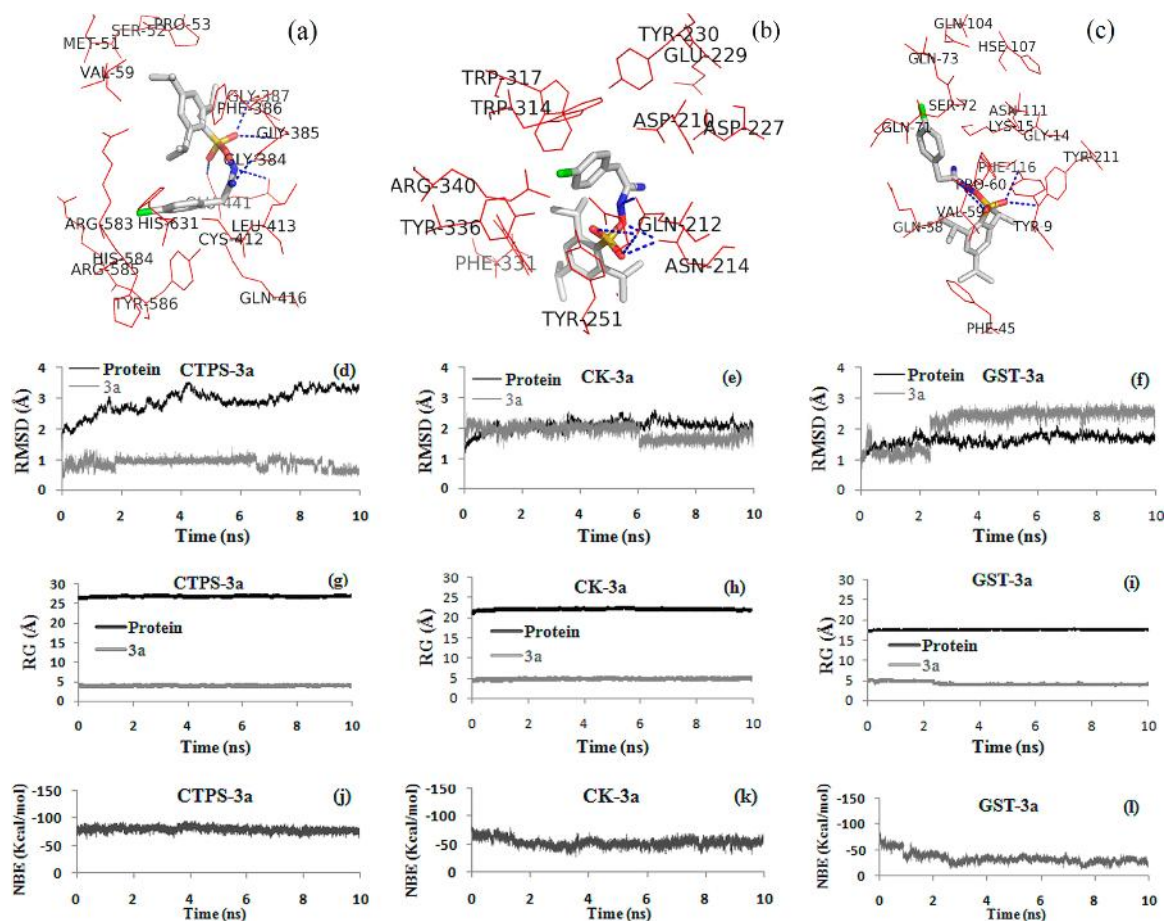
Figure 7. Docking (AUTODOCK) poses of compound **3a** in the target sites of (a) *Pf*-CTPS, (b) CK, and (c) GST, graphs of RMSDs (d−e), radii of gyration (RG) (g−i), and nonbonded interaction energies (NBEs) (j−l) from the MD simulation profile of the *Pf*-CTPS/CK/GST-compound **3a** complex.

for the antimalarial activity against sensitive as well as resistant strains. An examination of the physicochemical characteristics of R1 and R2 groups of the compounds indicated a preference to hydrophobicity (π) and/or molar refractivity (MR) for activity against both the strains (compounds **3a** and **3b** vs **3c**; **3d** and **3e** vs **3f**; **3h** vs **3i**, **3j**, and **3l**−**3n**). Furthermore, the properties (π and/or MR) of R2 substituent(s) showed some degree of cumulative influence on the activity (compounds **3a** vs **3b**; **3d** vs **3e**). Here, **3g** and **3h** are exceptions; it may be that the absence of a para-substitution (R1) on the aryl ring altered the scenario. It is also pointed out that the sensitive strain is more desirous of hydrophobic groups when compared to that of the resistant strain (compounds **3a** vs **3b**; **3d** vs **3e**). Compounds lacking π and/or MR R1 and R2 groups did not show high order of activity in either strain (compounds **3c**, **3f**, **3j**, and **3l**−**3n**). The electronic substituent constants of R1 and R2 groups have not shown a clear trend in inferring the activity profile of the compounds. Nevertheless, this does not rule out their influence on the antimalarial activity of the compounds.

3.8. MD Simulations. Sybyl's Surflex and AUTODOCK are two widely used tools for molecular docking in drug discovery studies. Between these two AUTODOCK is very popular as it is available in public domain and perceived to be very rigorous. With this view we repeated the docking analysis of the most active analogue **3a** (Table 3) and taken it further for molecular dynamics in NAMD. In AUTODOCK, the best docked pose of **3a** resulted in −9.31, −10.88, and −8.65 kcal/mol as binding

energies with *Pf*-CTPS, CK, and GST respectively (Figure 7a−c). Here the top ranked poses of **3a** occupied the same locations of the binding pockets as those from Surflex dock. Furthermore, the docked poses of **3a** in *Pf*-CTPS and GST target sites from Surflex and AUTODOCK showed comparable orientations, but the docked poses of **3a** in CK target site showed some deviation in their orientation (RMSDs between Surflex and AUTODOCK docked poses of **3a** in *Pf*-CTPS, CK and GST are 2.919, 4.587 and 2.861, respectively) (Figures 6 and 7; the superimposed docked poses are provided in the Supporting Information). We have no explanation for the deviation, but it is not unusual in docking exercises. Nevertheless, as in case of Surflex, the docked poses of **3a** from AUTODOCK indicated that =NH and NH of acetimidamide, =O of SO_3 and aryl moieties of the compound (**3a**) play key role in binding to the active sites of the enzymes through one or more H-bonds and/or arene interactions. Some key interactions observed in AUTODOCK poses are described below.

In *Pf*-CTPS, compound **3a** with its =NH, NH (of acetimidamide), and =O of SO_3 moieties anchored on to the binding pocket residues GLY384, GLY387, and GLU441 through H-bonds (Figure 7a). The back bones of GLY384 and GLY387 acted as H-bond acceptor and H-bond donor for =NH and =O of SO_3 moieties of the compound, respectively. The GLU441 with its side chain acted as hydrogen bond acceptor for the NH moiety of the compound. In CK, the compound used its =O of SO_3 moiety for H-bonding with the side chains of

GLN212 and ASN214 (Figure 7b). Apart from this, the chlorobenzene moiety present in compound **3a** showed arene interactions with the indole moiety of TRP317 (Figure 7b). In the docking experiment with GST, compound **3a** showed H-bond interactions with TYR9, VAL59, and TYR211. In this, the side chains of TYR9 and TYR211 acted as hydrogen bond donors for =O of SO$_3$ moiety, and the backbone of VAL59 acted as hydrogen bond acceptor for NH (of acetimidamide) moiety of the compound (Figure 7c).

While docking studies provide static frames of protein−ligand interactions, the trajectories from molecular dynamics (MD) simulations give scope to investigate the protein−ligand interactions and their energitics during the course of time. Hence, the trajectories of enzyme (*Pf*-CTPS/CK/GST)-compound **3a** complexes from the molecular dynamics (MD) simulations are analyzed to determine the quality of compound's binding and its affinity to the enzymes through their RMSDs from the docked state (Figure 7d−f), radius of gyration (RG; Figure 7g−i), nonbonded interaction energies (NBEs; Figure 7j−l), and intermolecular interactions. The RMSDs of *Pf*-CTPS-compound **3a** and CK-compound **3a** complexes suggest that during entire course of MD simulations, the protein and compound trajectories remained close to each other and retained similarity with their docked orientations (Figure 7d−e). Furthermore, their nonbonded energies remained almost uniform (Figure 7j−k) and RGs confirmed that these systems followed a harmonious swirl throughout the dynamics (Figure 7g−h). For the sake of analysis and discussion of intermolecular interactions, the poses of trajectories of enzyme-compound **3a** complexes were sampled at time intervals of 0.5, 2.0, 3.0, 5.0, 7.5, and 10 ns. The timeline figures of these trajectory poses are provided as part of the Supporting Information. They showed that, in *Pf*-CTPS-**3a** and CK-**3a** trajectories, the compound has maintained many of the prior observed H-bonds with these enzymes.

All through the dynamics of *Pf*-CTPS-**3a** complex, GLU441 has acted as acceptor in anchoring **3a**; GLY384 and GLY387 are other important residues in anchoring **3a** into the target site. In most of the trajectories of *Pf*-CTPS-**3a**, the =O of SO$_3$ of the compound has shown H-bond interactions with GLU441, GLY385, and GLY387; the NH moiety of the compound also formed H-bond with GLU441. Also, 2,4,6-tri-isopropylbenzene moiety of the compound participated in arene interaction with the PHE386. Apart from these H-bonds, in some other trajectories, the NH moiety of compound **3a** showed hydrogen bond with the backbone of GLY385 of *Pf*-CTPS.

In the MD simulation of CK-**3a** complex, GLN212 is one important residue acted as acceptor as well as donor in anchoring **3a**. In the samples of CK-**3a** trajectories, the =O of SO$_3$ of the compound showed H-bonds with GLN212 and GLU246. In addition to this, GLN212 showed interaction with the NH moiety of the compound. In some trajectories of CK, the side chain of TYR251 participated in H-bond with NH and =O of SO$_3$ moieties of compound **3a**. Furthermore, the TRP314 (with its indole moiety) and TYR251 (with its phenyl moiety) have respectively provided arene interactions with the aryl moieties of the compound. The videos of these MD simulations showed that in *Pf*-CTPS and CK, compound **3a** maintained the binding orientation comparable to that of its docked poses in the respective enzymes suggesting the durability and favorability of its interactions with the binding pocket residues.

The picture that emerged from the MD simulation of GST-**3a** complex is somewhat different from that of the *Pf*-CTPS and CK

systems. In a 10 ns MD simulation, the RMSDs of GST-compound **3a** trajectories indicated that while the protein maintained comparable 3D conformation all through the dynamics, the compound showed significant changes in its conformation after 2.5 ns and remained stable thereafter (Figure 7f). Also, the radius of gyration indicated that all through the dynamics the protein trajectories swirled close to each other; whereas, that of the compound showed a clear shift within the binding pocket (Figure 7i). The shift(s) in the compound conformation(s) is also reflected in the nonbonded energies of the system (Figure 7l). As the trajectories of the compound have undergone conformational variations during the simulations, it is also noticed that the compound forming H-bonds with different pocket residues of the protein trajectories. In addition to the prior mentioned interactions, it is observed that the compound's =NH and O= of SO$_3$ moieties showing hydrogen bonds with GLN58 and ASN111, respectively. Interestingly, in most of the sampled trajectories of GST-**3a**, the compound anchored onto the target site by H-bond with TYR9 and VAL59 through its =O of SO$_3$ and/or NH functional groups. An examination of the video of the trajectories of GST-compound **3a** complex from MD simulations showed that in the binding pocket the chlorobenzene moiety of the compound flipped during later part of dynamics and remained in that pose until the termination of MD simulation (i.e., 10 ns). Conformational changes in the docked ligands during MD simulations are known in the literature.[46] As the GST-compound **3a** complex showed a fast conformational change after 2.5 ns of MD simulation, a fresh simulation of GST complexed with another docked pose of **3a** (second best docked pose from AUTODOCK) has been carried out for 10 ns to examine the influence of starting pose on the outcome of the results.[47] For this MD simulation all the parameters are kept same as in case of previous GST-**3a** run. We noticed that even though the starting **3a** conformations are different in these experiments, during the course of MD simulation, the conformation of **3a** shifted toward a pose comparable to that of one emerged from previous run. In the second experiment also the chlorobenzene moiety of the compound almost attained same orientation during later part of dynamics (figures and data are in the Supporting Information).

In multitarget approach primarily the drug should be sufficiently tuned to bind to the pathogen's designated enzymes, and at the same time should avoid binding to human proteins. In view of this, the relevance of prototype compound **3a** to *Pf*-CTPS, CK, and GST, in comparison to the matching human proteins, is examined by BLAST search of the respective target sequences (for similarity) and by comparing the docking scores of the compound **3a** against parasite and human targets. An examination of relevant protein sequences of parasite and human revealed that while the binding pocket residues of CTPS and CK are conserved in them, in GST the same are less conserved (<50%). Furthermore, in the BLAST search, the CTPS, CK, and GST from parasite and human sources showed sequence identity between 29 to 38%. These may hint at the dissimilarity of parasite and human proteins. Interestingly, in Surflex-Dock compound **3a** showed higher affinity toward the parasite enzymes when compared to that of human enzymes (Dock scores of *Pf*-enzymes: CTPS, 6.52; CK, 9.17; GST, 6.93. Dock scores of human enzymes: CTPS, 3.74; CK, 5.89; GST, 5.65). These are very preliminary and in vivo studies give the final call on the matter.

These findings collectively suggested that prototype compound **3a** with SO3, =NH, and/or NH functionalities flanked by aryl groups may be critical for binding to *Pf*-CTPS, CK, and GST and suitable for the exploration/development as CCE against the said enzymes. For these systems free energy simulations[48] would have provided more reliable estimates of protein−ligand binding affinities and energetics of conformational changes. However, we could not implement them as they are computationally expensive and beyond our reach. All the same, this prototype compound is worth exploring and may come to use in overcoming the clinical issues associated with routinely used antimalarial drugs.

4. CONCLUSIONS

This study has explored a strategy to design new class of antimalarials through identifying consensus inhibitor against multiple enzyme targets. For this, *Pf*-CTPS, CK, and GST were selected from a database of fifty-six drug targets of *P. falciparum* based on their connectedness and functional importance in biochemical/metabolic pathways. In the absence of 3D structure of *Pf*-CTPS, it has been developed from the FASTA sequence by employing protein structural modeling techniques. The target sites of the selected enzymes were utilized in the virtual screening of chemical structures from ZINC database to identify consensus chemical entity to inhibit them. This has led to the design and synthesis of arylsulfonyloxy acetimidamides as new class of compounds against malaria. Some of these compounds showed good activity against CQ-sensitive (3D7) and resistant (K1) strains of *P. falciparum*. In docking studies these compounds showed binding affinity toward the selected enzymes. Furthermore, the molecular dynamics simulations carried out on these enzymes complexed with compound **3a** ascertained the importance of SO3, =NH, and/or NH functionalities flanked by aryl groups in bind to *Pf*-CTPS, CK, and GST through one or more H-bonds and/or arene interactions. The findings collectively paved the way for arylsulfonyloxy acetimidamides as new class of antimalarial agents. As new chemical scaffolds are urgently needed and are in high demand for the clinical management of malaria, this is a step toward opening a window for the exploration of new antimalarial agents.

■ ASSOCIATED CONTENT

ⓈSupporting Information

The Supporting Information is available free of charge on the ACS Publications website at DOI: 10.1021/acs.jcim.5b00392.

Further detail on work flow, druggable enzyme database, selection of target enzymes, structural modeling, virtual screening, synthesis, docking and dynamics, and references (PDF)

Full data corresponding to Tables S8 and S9 (PDF)

MD simulation video of *Pf*-CTPS-compound 3a complex (AVI)

MD simulation video of CK-compound 3a complex (AVI)

MD simulation video of GTS-compound 3a complex (AVI)

MD simulation video of GTS complexed with alternative pose of compound 3a (AVI)

■ AUTHOR INFORMATION

Corresponding Author

*Phone: +91-522-2772450. Fax: +91-522-2771941. E-mail: yenpra@yahoo.com.

Notes

The authors declare no competing financial interest.

■ ACKNOWLEDGMENTS

■ REFERENCES

(1) *World malaria report 2014*; World Health Organization: Geneva, 2014; pp 1−227; http://www.who.int/malaria/publications/world_malaria_report_2014/wmr-2014-no-profiles.pdf.

(2) Flannery, E. L.; Chatterjee, A. K.; Winzeler, E. A. Antimalarial Drug Discovery - Approaches and Progress Towards New Medicines. *Nat. Rev. Microbiol.* **2013**, *11*, 849−862.

(3) Njogu, P. M.; Chibale, K. Recent Developments in Rationally Designed Multitarget Antiprotozoan Agents. *Curr. Med. Chem.* **2013**, *20*, 1715−1742.

(4) Li, K.; Schurig-Briccio, L. A.; Feng, X.; Upadhyay, A.; Pujari, V.; Lechartier, B.; Fontes, F. L.; Yang, H.; Rao, G.; Zhu, W.; Gulati, A.; No, J. H.; Cintra, G.; Bogue, S.; Liu, Y. L.; Molohon, K.; Orlean, P.; Mitchell, D. A.; Freitas-Junior, L.; Ren, F.; Sun, H.; Jiang, T.; Li, Y.; Guo, R. T.; Cole, S. T.; Gennis, R. B.; Crick, D. C.; Oldfield, E. Multitarget Drug Discovery for Tuberculosis and other Infectious Diseases. *J. Med. Chem.* **2014**, *57*, 3126−3139.

(5) White, N. J. Antimalarial Drug Resistance. *J. Clin. Invest.* **2004**, *113*, 1084−1092.

(6) Bloland, P. B. *Drug Resistance in Malaria*; World Health Organization: Geneva, 2001; pp 1−27; http://www.who.int/csr/resources/publications/drugresist/malaria.pdf.

(7) Gardner, M. J.; Hall, N.; Fung, E.; White, O.; Berriman, M.; Hyman, R. W.; Carlton, J. M.; Pain, A.; Nelson, K. E.; Bowman, S.; Paulsen, I. T.; James, K.; Eisen, J. A.; Rutherford, K.; Salzberg, S. L.; Craig, A.; Kyes, S.; Chan, M. S.; Nene, V.; Shallom, S. J.; Suh, B.; Peterson, J.; Angiuoli, S.; Pertea, M.; Allen, J.; Selengut, J.; Haft, D.; Mather, M. W.; Vaidya, A. B.; Martin, D. M.; Fairlamb, A. H.; Fraunholz, M. J.; Roos, D. S.; Ralph, S. A.; McFadden, G. I.; Cummings, L. M.; Subramanian, G. M.; Mungall, C.; Venter, J. C.; Carucci, D. J.; Hoffman, S. L.; Newbold, C.; Davis, R. W.; Fraser, C. M.; Barrell, B. Genome Sequence of the Human Malaria Parasite *Plasmodium Falciparum*. *Nature* **2002**, *419*, 498−511.

(8) Hendriks, E. F.; O'Sullivan, W. J.; Stewart, T. S. Molecular Cloning and Characterization of the *Plasmodium Falciparum* Cytidine Triphosphate Synthetase Gene. *Biochim. Biophys. Acta, Gene Struct. Expression* **1998**, *1399*, 213−218.

(9) Ancelin, M. L.; Vial, H. J. Quaternary Ammonium Compounds Efficiently Inhibit *Plasmodium Falciparum* Growth in Vitro by Impairment of Choline Transport. *Antimicrob. Agents Chemother.* **1986**, *29*, 814−820.

(10) Hiller, N.; Fritz-Wolf, K.; Deponte, M.; Wende, W.; Zimmermann, H.; Becker, K. *Plasmodium Falciparum* Glutathione S-transferase–Structural and Mechanistic Studies on Ligand Binding and Enzyme Inhibition. *Protein Sci.* **2006**, *15*, 281−289.

(11) Schomburg, I.; Chang, A.; Placzek, S.; Sohngen, C.; Rother, M.; Lang, M.; Munaretto, C.; Ulas, S.; Stelzer, M.; Grote, A.; Scheer, M.; Schomburg, D. BRENDA in 2013: Integrated Reactions, Kinetic Data,

Enzyme Function Data, Improved Disease Classification: New Options and Contents in BRENDA. *Nucleic Acids Res.* **2013**, *41*, D764−D772.

(12) Irwin, J. J.; Shoichet, B. K. ZINC−a Free Database of Commercially Available Compounds for Virtual Screening. *J. Chem. Inf. Model.* **2005**, *45*, 177−182.

(13) *SYBYL*, version 7.3; Tripos Associates, St. Louis, MO, 2006.

(14) Morris, G. M.; Huey, R.; Lindstrom, W.; Sanner, M. F.; Belew, R. K.; Goodsell, D. S.; Olson, A. J. AutoDock4 and AutoDockTools4: Automated Docking with Selective Receptor Flexibility. *J. Comput. Chem.* **2009**, *30*, 2785−2791.

(15) Phillips, J. C.; Braun, R.; Wang, W.; Gumbart, J.; Tajkhorshid, E.; Villa, E.; Chipot, C.; Skeel, R. D.; Kale, L.; Schulten, K. Scalable Molecular Dynamics with NAMD. *J. Comput. Chem.* **2005**, *26*, 1781−1802.

(16) Wilkins, M. R.; Gasteiger, E.; Bairoch, A.; Sanchez, J. C.; Williams, K. L.; Appel, R. D.; Hochstrasser, D. F. Protein Identification and Analysis Tools in the ExPASy Server. *Methods Mol. Biol.* **1999**, *112*, 531−552.

(17) Muller, S. A.; Kohajda, T.; Findeiss, S.; Stadler, P. F.; Washietl, S.; Kellis, M.; von Bergen, M.; Kalkhof, S. Optimization of Parameters for Coverage of low Molecular Weight Proteins. *Anal. Bioanal. Chem.* **2010**, *398*, 2867−2881.

(18) Altschul, S. F.; Gish, W.; Miller, W.; Myers, E. W.; Lipman, D. J. Basic Local Alignment Search Tool. *J. Mol. Biol.* **1990**, *215*, 403−410.

(19) Kelley, L. A.; Sternberg, M. J. Protein Structure Prediction on the Web: a Case Study Using the Phyre Server. *Nat. Protoc.* **2009**, *4*, 363−371.

(20) Cole, C.; Barber, J. D.; Barton, G. J. The Jpred 3 Secondary Structure Prediction Server. *Nucleic Acids Res.* **2008**, *36*, W197−W201.

(21) Webb, B.; Sali, A. Comparative Protein Structure Modeling Using MODELLER. *Curr. Protoc. Bioinformatics* **2014**, *47*, 5.6.1−5.6.32.

(22) Linding, R.; Jensen, L. J.; Diella, F.; Bork, P.; Gibson, T. J.; Russell, R. B. Protein Disorder Prediction: Implications for Structural Proteomics. *Structure* **2003**, *11*, 1453−1459.

(23) Marchler-Bauer, A.; Derbyshire, M. K.; Gonzales, N. R.; Lu, S.; Chitsaz, F.; Geer, L. Y.; Geer, R. C.; He, J.; Gwadz, M.; Hurwitz, D. I.; Lanczycki, C. J.; Lu, F.; Marchler, G. H.; Song, J. S.; Thanki, N.; Wang, Z.; Yamashita, R. A.; Zhang, D.; Zheng, C.; Bryant, S. H. CDD: NCBI's Conserved Domain Database. *Nucleic Acids Res.* **2015**, *43*, D222−D226.

(24) Hall, T. A. BioEdit: a User-Friendly Biological Sequence Alignment Editor and Analysis Program for Windows 95/98/NT. *Nucl. Acids. Symp. Ser.* **1999**, *41*, 95−98.

(25) Laskowski, R. A.; MacArthur, M. W.; Moss, D. S.; Thornton, J. M. PROCHECK: a Program to Check the Stereochemical Quality of Protein Structures. *J. Appl. Crystallogr.* **1993**, *26*, 283−291.

(26) Wiederstein, M.; Sippl, M. J. ProSA-Web: Interactive Web Service for the Recognition of Errors in Three-Dimensional Structures of Proteins. *Nucleic Acids Res.* **2007**, *35*, W407−10.

(27) Schuler, L. D.; Daura, X.; van Gunsteren, W. F. An Improved GROMOS96 Force Field for Aliphatic Hydrocarbons in the Condensed Phase. *J. Comput. Chem.* **2001**, *22*, 1205−1218.

(28) Guex, N.; Peitsch, M. C.; Schwede, T. Automated Comparative Protein Structure Modeling with SWISS-MODEL and Swiss-PdbViewer: a Historical Perspective. *Electrophoresis* **2009**, *30*, S162−S173.

(29) Humphrey, W.; Dalke, A.; Schulten, K. VMD: Visual Molecular Dynamics. *J. Mol. Graphics* **1996**, *14*, 33−38.

(30) Pedretti, A.; Villa, L.; Vistoli, G. VEGA−an Open Platform to Develop Chemo-Bio-informatics Applications, Using Plug-in Architecture and Script Programming. *J. Comput.-Aided Mol. Des.* **2004**, *18*, 167−173.

(31) Video match. http://gromada.com/main/download.php (accessed June 16, 2015).

(32) Lin, C. C.; Hsieh, T. H.; Liao, P. Y.; Liao, Z. Y.; Chang, C. W.; Shih, Y. C.; Yeh, W. H.; Chien, T. C. Practical Synthesis of N-substituted Cyanamides via Tiemann Rearrangement of Amidoximes. *Org. Lett.* **2014**, *16*, 892−895.

(33) Singh, S.; Srivastava, R. K.; Srivastava, M.; Puri, S. K.; Srivastava, K. *In-Vitro* Culture of *Plasmodium Falciparum*: Utility of Modified (RPNI) Medium for Drug-Sensitivity Studies using SYBR Green I Assay. *Exp. Parasitol.* **2011**, *127*, 318−3121.

(34) Sharma, M.; Chauhan, K.; Chauhan, S. S.; Kumar, A.; Singh, S. V.; Saxena, J. K.; Agarwal, A.; Srivastava, K.; Kumar, S. R.; Puri, S. K.; Shah, P.; Siddiqi, M. I.; Chauhan, P. M. S. Synthesis of Hybrid 4-Anilinoquinoline Triazine as Potent Antimalarial Agents, their *in Silico* Modeling and Bioevaluation as *Plasmodium Falciparum* Transketolase and *β*-Hematin Inhibitors. *Med. MedChemComm* **2012**, *3*, 71−79.

(35) Lauritsen, I.; Willemoes, M.; Jensen, K. F.; Johansson, E.; Harris, P. Structure of the Dimeric form of CTP Synthase from Sulfolobus Solfataricus. *Acta Crystallogr., Sect. F: Struct. Biol. Cryst. Commun.* **2011**, *67*, 201−208.

(36) Goto, M.; Omi, R.; Nakagawa, N.; Miyahara, I.; Hirotsu, K. Crystal Structures of CTP Synthetase Reveal ATP, UTP, and Glutamine Binding Sites. *Structure* **2004**, *12*, 1413−23.

(37) Binkowski, T. A.; Naghibzadeh, S.; Liang, J. CASTp: Computed Atlas of Surface Topography of Proteins. *Nucleic Acids Res.* **2003**, *31*, 3352−3355.

(38) *MOE*; The Molecular Operating Environment from Chemical Computing Group Inc., Montreal, Quebec, Canada; http://www.chemcomp.com.

(39) Wernimont, A. K.; Pizarro, J. C.; Artz, J. D.; Amaya, M. F.; Xiao, T.; Lew, J.; Wasney, G.; Senesterra, G.; Kozieradzki, I.; Cossar, D.; Vedadi, M.; Schapira, M.; Bochkarev, A.; Arrowsmith, C. H.; Bountra, C.; Weigelt, J.; Edwards, A. M.; Hui, R.; Hills, T. Crystal Structure of Choline Kinase from *Plasmodium Falciparum*, PF14_0020. *PDB*; DOI: 10.2210/pdb3fi8/pdb.

(40) Hiller, N.; Fritz-Wolf, K.; Deponte, M.; Wende, W.; Zimmermann, H.; Becker, K. *Plasmodium Falciparum* Glutathione S-Transferase−Structural and Mechanistic Studies on Ligand Binding and Enzyme Inhibition. *Protein Sci.* **2006**, *15*, 281−289.

(41) Hofer, A.; Steverding, D.; Chabes, A.; Brun, R.; Thelander, L. *Trypanosoma Brucei* CTP synthetase: a Target for the Treatment of African Sleeping Sickness. *Proc. Natl. Acad. Sci. U. S. A.* **2001**, *98*, 6412−6416.

(42) Torres-Rivera, A.; Landa, A. Glutathione Transferases from Parasites: a Biochemical View. *Acta Trop.* **2008**, *105*, 99−112.

(43) Choubey, V.; Maity, P.; Guha, M.; Kumar, S.; Srivastava, K.; Puri, S. K.; Bandyopadhyay, U. Inhibition of *Plasmodium Falciparum* Choline Kinase by Hexadecyltrimethylammonium Bromide: a Possible Antimalarial Mechanism. *Antimicrob. Agents Chemother.* **2007**, *51*, 696−706.

(44) Alberge, B.; Gannoun-Zaki, L.; Bascunana, C.; Tran van Ba, C.; Vial, H.; Cerdan, R. Comparison of the Cellular and Biochemical Properties of *Plasmodium falciparum* Choline and Ethanolamine Kinases. *Biochem. J.* **2010**, *425*, 149−158.

(45) Hansch, C.; Leo, A. In *Substituent Constants for Correlation Analysis in Chemistry and Biology*; Wiley: New York, 1979; Chapter 6, pp 48−63.

(46) Shan, Y.; Kim, E. T.; Eastwood, M. P.; Dror, R. O.; Seeliger, M. A.; Shaw, D. E. How does a Drug Molecule find its Target Binding Site? *J. Am. Chem. Soc.* **2011**, *133*, 9181−9183.

(47) Stjernschantz, E.; Oostenbrink, C. Improved Ligand-Protein Binding Affinity Predictions using Multiple Binding Modes. *Biophys. J.* **2010**, *98*, 2682−2691.

(48) Genheden, S.; Ryde, U. Improving the Efficiency of Protein−Ligand Binding Free-Energy Calculations by System Truncation. *J. Chem. Theory Comput.* **2012**, *8*, 1449−1458.

Synthesis, Biological Evaluation and Molecular Modeling Studies of New 2,3-Diheteroaryl Thiazolidin-4-Ones as NNRTIs

Utsab Debnath[1,2], Saroj Verma[1], Pankaj Singh[3], Kavita Rawat[4], Satish K. Gupta[3], Raj K. Tripathi[4], Hefazat H. Siddiqui[2], Seturam B. Katti[1] and Yenamandra S. Prabhakar[1,*]

[1]*Medicinal & Process Chemistry Division, CSIR-Central Drug Research Institute, Sector-10, Jankipuram Extension, Lucknow, Uttar Pradesh 226 031, India*
[2]*Faculty of Pharmacy, Integral University, Lucknow, Uttar Pradesh 226 026, India*
[3]*Reproductive Cell Biology Laboratory, National Institute of Immunology, Aruna Asaf Ali Marg, New Delhi 110 067, India*
[4]*Toxicology Division, CSIR-Central Drug Research Institute, Sector-10, Jankipuram Extension, Lucknow, Uttar Pradesh 226 031, India*
Corresponding author: Yenamandra S. Prabhakar, yenpra@yahoo.com
Second and third author have equally contributed.

In a focused exploration, thiazolidin-4-ones with different C-2 and N-3 substituent groups were synthesized and evaluated as non-nucleoside reverse transcriptase inhibitors against HIV-1. This has led to new active compounds sporting heteroaryls at both C-2 and N-3 positions prompting to view them in the backdrop of nevirapine. To assign the molecular attributes for the activity, the compounds are investigated by docking them into non-nucleoside inhibitor-binding pocket of HIV-1 reverse transcriptase (RT). The most active compounds of this series (7d and 7f) shared spatial features with nevirapine with added molecular flexibility. Furthermore, in molecular dynamics simulations carried out for up to 10 ns, the compounds 7d and 7f showed consistency in their interactions with non-nucleoside inhibitor-binding pocket of HIV-1 RT and suggested Tyr319 and Val106 as potential residues for H-bond interaction with these molecules. These results open new avenues for the exploration of 2,3-diheteroaryl thiazolidin-4-ones for prevention of HIV-1.

The human immunodeficiency virus-1 (HIV-1) is the causative agent of the acquired immunodeficiency syndrome (AIDS) (1). As per the UNAIDS report, worldwide approximately 35.3 (32.2–38.8) million people were positive for HIV-1 in the year 2013.[a] Ever since recognizing the seriousness of this infection, considerable efforts have been made to identify crucial viral targets and the chemical entities to tackle them (2,3). Reverse transcriptase (RT) is a key enzyme in the life cycle of this virus. It has been widely explored as a drug target (4,5). Two classes of compounds have gained prominence as potential inhibitors of this enzyme. With due consideration to chemical classes, they are termed as nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs) and non-nucleoside reverse transcriptase inhibitors (NNRTIs) (6). Between them, NNRTIs have received a great deal of attention because of their low toxicity and favourable pharmacokinetic properties (7). It is attributed to the compound's interaction with an allosteric site on the enzyme (8). Also, the enzyme's allosteric site is flexible to accommodate variety of chemical entities. With this knowledge, researchers have investigated more than thirty different scaffolds which include pyrimidinones, thiazolidinones, benzylpyridinones, quinolines, imidazoles, indoles and triazoles as HIV-1 RT inhibitors (3,9). These studies have confirmed the importance of compounds ability to attain 'butterfly-like' conformation and its hydrophobic and electronic properties for the activity. Several compounds from these chemical classes have reached clinics (10). However, the advantage of HIV-1 RT accommodating diverse NNRTIs is negated by the development of quick resistance to different drugs from these chemical classes (11). This has called for renewed efforts to discover new ways to modify the chemical space of compounds and/or alternative targets for the HIV-1 chemotherapy.

Giving due consideration to the aforesaid, our group and others have explored 2,3-diaryl-1,3-thiazolidin-4-ones for new anti-HIV-1 agents (12–19). In these explorations, attempts were made to alter the lipophilicity, steric and electronic properties of the compounds to suit to the viral enzyme. Several of these analogues showed moderate to good anti-HIV-1 activity via the inhibition of viral RT. Furthermore, the quantitative structure–activity relationship (QSAR) and docking studies of these analogues suggested

the importance of compound's overall hydrophobicity and the presence of hetero atoms on the 2- and 3-aryl moieties of the scaffold for the activity (20). These findings (12–20) suggested that modification of C-2 and N-3 substitutions of thiazolidin-4-one have scope for further exploration.

In continuation of these observations, now we wish to expand the thiazolidinones with new heteroaromatic substituent groups at C-2 and N-3 positions. In this endeavour, thiazolidin-4-ones with different heteroaromatic groups at C-2 and N-3 positions are synthesized as NNRTIs for exploring their *in vitro* and cell-based activities. The potential interactions of these compounds with the HIV-1 RT are investigated using docking studies. Furthermore, molecular dynamics studies were carried out on the most promising compounds to obtain the in-depth view of molecules' interactions with the non-nucleoside inhibitor-binding pocket (NNIBP) of RT. These studies suggested that compounds having the ability to form hydrogen bond interaction with Tyr319 and Val106, and hydrophobic interactions with Phe227, Trp229, Leu234, Tyr181 and Tyr188 are important for the inhibition of RT.

Materials and Methods

General procedure for synthesis of compounds selected for C-2 and N-3 exploration
The synthesis of the compounds (**4a–4f** and **7a–7j**) was carried out according to the earlier reported procedure (Schemes 1 and 2) (15). The final compounds were obtained as racemic mixtures. Our attempts to separate them were not successful. The compounds were characterized by their spectral analysis through IR, ESI-MS, ^{1}H-NMR, ^{13}C-NMR and HRMS.

Inhibition of HIV-1 RT
The anti-HIV-1 RT activity of the compounds was assayed using a non-radioactive colorimetric ELISA RT Assay kit (Roche).[b] The assay procedure was described elsewhere (19,21). The RT activity of compounds is measured using ELISA reader at 405 nm (reference wavelength: 490 nm) in the form of optical density (OD) of colour intensity developed in the test. The percentage inhibitory activity of RT inhibitors was calculated using the formula given below.

$$\% \text{ RT inhibition} = 100 - \left(\frac{\text{OD with inhibitor}}{\text{OD without inhibitor}} \right) \times 100$$

Anti-HIV-1 activity and cytotoxicity assay in TZM-bl cells
Anti-HIV-1 and cytotoxicity of the compounds were assessed using MTT (3-(4,5-dimethylthiazol-2-yl)-2,5 diphenyltetrazolium bromide; Sigma-Aldrich Inc.) assay (22). Anti-HIV-1 activity was calculated by taking the mean read-out in experimental group divided by the mean read-out in infected cells in the absence of test compound multiplied by hundred. The results were expressed as percentage inhibition by subtracting the above value from hundred.

Docking and molecular dynamics
Docking procedure was implemented in SYBYL package 7.3, on silicon graphics fuel workstation with IRIX 6.5 as operating system (23). Molecular dynamics simulation was carried out on protein–compound (7d and 7f) complex in NAMD2.7 (24).

Results and Discussion

Synthesis and biological evaluation
The earlier CoMFA and CoMSIA 3D-QSAR studies on thiazolidin-4-ones showed the importance of steric, electrostatic and hydrophobic fields around the scaffold for the HIV-1 inhibitory activity in these compounds (20). More specifically, it indicated a preference for halo-substituted aryl and heteroaryls at C-2 and heteroaryls at N-3 for activity (18). Keeping this in view, we explored thiazolidin-4-one scaffold with different heteroaryls and a few aryls as C-2 and N-3 substituent groups for identifying new analogues against HIV-1 RT. It has been initiated by varying the C-2 substituent groups. In NNRTIs, the chemical space surrounding N-3 position of thiazolidinone is more desirous of substituent groups with steric and electrostatic characteristics for the activity. The triazole, oxazole and like groups provide this kind of environment. Thus, N-3 substituent is fixed as 1,2,4-triazole moiety and altered the C-2 substituent with different six-membered aromatic and heteroaromatic groups to result in compounds **4a–4f** (Scheme 1). The HIV-1 RT activity of these compounds is shown in Table 1. These compounds revealed the signifi-
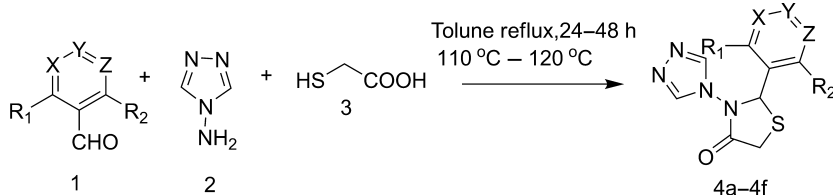
Scheme 1: General procedure for synthesis of C-2-substituted thiazolidin-4-ones.
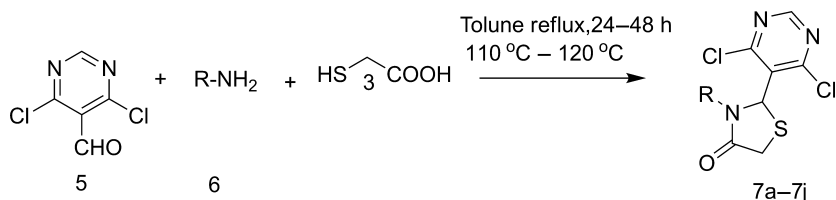
Scheme 2: General procedure for synthesis of N-3-substituted thiazolidin-4-ones.

R = five and six member heteroaromatic ring

cance of different 2,6-dihalo groups on the C-2 aryl moiety of thiazolidinone for the anti-HIV-1 activity. The activity profiles also confirmed the significance of chloro- and fluoro-substituted aryls (compounds **4a** and **4b**) over the bromo ones (compound **4e**) for anti-RT activity (Table 1). The nature of the aryl substituents prompted us to incline towards the electronic properties as cause of these variations in the activity. Furthermore, these results indicate that pyrimidine moiety at C-2 position of thiazolidine ring was advantageous for the activity when compared to all other C-2 substituents, which included pyridine and phenyl moieties. This data collectively point towards the necessity of steric/hydrophobic groups with some degree of electrostatic properties at C-2 position for the activity (compounds **4d** and **4f**; Table 1).

Armed with this, the C-2 substituent was fixed as 2,6-dichloropyrimidine group and further explored the thiazolidinone's N-3 substituent with different five- and six-membered heterocyclic moieties, which included pyridine, pyrimidine, oxazole and thiazole (compounds **7a–7j**; Scheme 2). From this set of compounds, the N-3 pyrimi-

dine analogues showed promising anti-HIV-1 RT activity (compounds **7d** and **7f**; Tables 2 and 3). However, some analogues with triazine and oxazole moieties (e.g. compounds **7g** and **7h**) with notable *in vitro* activity showed poor performance in cell-based assay. These compounds were found to be less soluble in the test system. The compounds with N-3 pyridine moiety (compounds **7a** and **7b**; Table 2) did not do well both in *in vitro* and cell-based assays due to their poor electrostatic character. These findings further support the presence of pyrimidine-like group at N-3 position of thiazolidinones for anti-HIV-1 activity.

Docking
The docking scores rarely give an opportunity to accurately predict the activity of compounds. Keeping this in view, the docking experiments on the compounds (Tables 1 and 2) were carried out to examine the scope of its gross concurrence with the inhibitory activity and probe their possible interactions with the NNIBP of HIV-1 RT (PDB ID: **1VRT**). In these compounds, C-2 is chiral

Table 1: *In vitro* and cell-based HIV-1 inhibitory activities, docking and postdocking scores of C-2-substituted thiazolidin-4-ones

| Compound | Ar | CLogP | Anti-HIV-1 assay | | Docking score[c] | B.E. (postdocking optimization)[d] |
			In vitro[a]	Cell line[b]		
4a	2,6-dichlorophenyl	2.22	61.69	39.08 ± 10.13	7.51	14.37
4b	2-chloro-6-fluorophenyl	1.82	52.91	12.63 ± 18.46	7.48	11.63
4c	2,6-difluorophenyl	1.42	47.03	NT[e]	7.37	8.60
4d	3,5-dichloropyridin-4-yl	0.88	62.03	26.58 ± 19.26	7.49	11.55
4e	3,5-dibromopyridin-4-yl	1.43	45.57	NT[e]	7.00	7.33
4f	4,6-dichloropyrimidin-5-yl	0.97	72.15	27.27 ± 19.47	7.59	14.78

[a]*In vitro* HIV-1 reverse transcriptase (RT) kit assay (100 μg/mL).
[b]TZM-bl cell line-based HIV-1 assay (5 μg/mL); only for those compounds which showed 50% or more inhibition in HIV-1 RT kit assay were considered for the cell-based assay and cytotoxicity profiling.
[c]Docking score in binding energy (-Kcal/mol) from AutoDock for non-nucleoside inhibitor-binding pocket of RT from pdb **1VRT**.
[d]Post docking optimization (-Kcal/mol): Postdocking optimization was done by single-point AMMP minimization. Binding energy = Total energy of pocket–ligand complex − (Total energy of pocket + Total energy of ligand).
[e]Not tested.

Table 2: *In vitro* and cell-based HIV-1 inhibitory activities, docking and postdocking scores of N-3-substituted thiazolidin-4-ones

Compound	Ar'	CLogP	*In vitro*[a]	Cell line[b]	Docking score[c]	B.E. (postdocking optimization)[d]
			Anti-HIV-1 assay			
7a	Pyridin-2-yl	2.74	30.72	NT[e]	6.11	8.09
7b	5-methylpyridin-2-yl	3.23	31.44	NT[e]	6.10	7.73
7c	Pyrimidin-2-yl	1.94	56.93	<5	6.72	8.98
7d	4,6-dimethylpyrimidin-2-yl	3.34	79.97	71.65 ± 7.79	7.92	18.34
7e	4,6-dichloropyrimidin-5-yl	3.74	44.49	NT[e]	7.02	13.43
7f	4,6-dimethoxypyrimidin-2-yl	3.11	61.38	96.97 ± 0.25	7.73	16.43
7g	4-methoxy-6-methyl-1,3,5-triazin-2-yl	3.37	60.93	<5	7.23	15.25
7h	4-methyloxazol-2-yl	2.42	65.81	<5	7.12	12.34
7i	4,6-dichloropyrimidin-5-yl	3.84	31.14	NT[e]	6.51	8.28
7j	Thiazol-2-yl	3.08	42.16	NT[e]	7.17	14.74

[a–e]See Table 1 for footnotes.

Table 3: The IC_{50}, CC_{50} and SI values of compounds **7d** and **7f**

Compound	IC_{50}[a] (μM)	CC_{50}[b] (μM)	SI[c]
	Anti-HIV-1 assay		
7d	6.31 ± 0.19	98.26 ± 13.25	15.57
7f	3.58 ± 0.2	82.55 ± 4.85	23.05
NVP[d]	1.64 ± 0.21	1039.41	633.80

[a]The concentration of compound required to achieve 50% protection cell from HIV-1-induced cytotoxicity.
[b]Concentration required to reduce TZM-bl cell viability by 50%.
[c]Selectivity index ratio CC_{50}/IC_{50}.
[d]Nevirapine used as positive reference control.

centre and the compounds could not be resolved into optically pure enantiomers in spite our best efforts. In docking experiments, however, both R and S isomers were examined separately for their binding to the target. In these experiments, both the isomers showed almost parallel binding energies. The versatile nature of the RT binding pocket in accommodating diverse compounds may be seen as a reason for this trend. Moreover, the anti-RT activity of these compounds is nearly correlated in the same fashion with the docking scores of each enantiomer. In view of this, the R-isomer, which is best fit with the butterfly-like conformation of nevirapine, is selected.

The interactions of docked molecules with the enzyme highlighted the significance of steric and electrostatic requirements along with H-bonds for anti-HIV-1 RT activity. Also, the compounds are prominently surrounded by several residues in the binding pocket of the enzyme (data

shown in Supporting information). In the docking experiments, the most active compounds **7d**, **7f** and **4f**, respectively, showed −7.92, −7.73 and −7.59 kcal/mol as binding energy. In these and other active compounds, the C-2 and N-3 substituents of thiazolidin-4-one occupied the space of aromatic moieties on either side of the benzodiazepine ring of nevirapine. The central thiazolidin4-one moiety itself occupied the space of benzodiazepine ring of nevirapine, giving the compounds butterfly-like shape (Figure 2). Compounds **4f**, **7d** and **7f** showed one or more H-bond and π–π interactions with Lys101, Tyr181, Tyr188, Phe229, Trp227 and/or Tyr318 residues (Figure 1), which are otherwise absent in low active molecules (e.g. **7a** and **7b**). Also, compounds with too bulky groups at C-2 and/or N-3 (e.g. **4e** and **7i**) docked partially or near the entrance of binding pocket. The improper binding of these compounds reflected in their poor binding energies (Table 2).

Molecular dynamics

The interactions of most active compounds, that is **7d** and **7f** with the HIV-1 RT, are further assessed through MD simulations to determine their quality of the binding and affinity to the enzyme. The protein–compound (**7f/7d**) complex trajectories from MD simulations are analysed for their RMSDs, radius of gyration (RG), non-bonded interaction energies and intermolecular interactions. The RMSDs of HIV-1 RT–compound complex suggested that during entire course of MD simulations, the protein and the compound trajectories remained close to each other and retained similarity with their initial poses (Figure 2). The RG indicated harmonious swirl of the system throughout the dynamics. Also, sampling of the trajectories indicated that
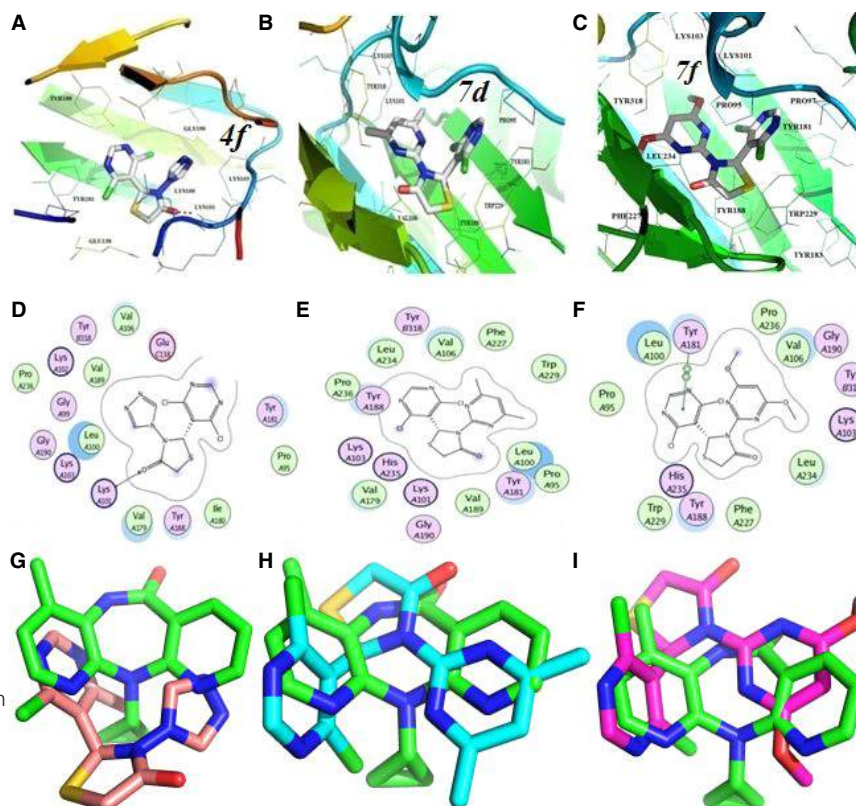
Figure 1: Docked poses of compounds **4f**, **7d** and **7f**: A, B and C, respectively, represent **4f**, **7d** and **7f** embedded in the residues of non-nucleoside inhibitor-binding pocket of HIV-1 reverse transcriptase (RT; PDB ID **1VRT**); D, E and F, respectively, represent the 2D diagram of **4f**, **7d** and **7f** in the same binding site; G, H and I, respectively, show the superimposition of **4d**, **7d** and **7f** with nevirapine crystal structure from **1VRT**.

during the course of simulations, the compounds have, for all practical purposes, maintained the interactions observed in their docked poses. They also highlighted the importance of other residues of binding pocket in the non-bonded interactions with the compounds (Figure 2). Apart from the foregoing, in several trajectories, H-bonds are noticed between carbonyl of thiazolidinone (**7d**) and hydroxyl of Tyr319 as well as C2-pyrimidine (**7f**) and carbonyl of Val106 (Figure 2).

Conclusions

The C-2 and N-3 substitutions of thiazolidin-4-ones play important role in the HIV-1 RT inhibitory activity of the compounds. The investigation presented here opened the way for new compounds with heteroaryl moieties at C-2 and N-3 positions of the scaffold sharing features with nevirapine and, at the same time, provided diversity for molecular exploration. It clearly suggested the favourable nature of chloro and fluoro substitutions at 2 and 6 positions of C-2 heteroaromatic moiety in comparison with corresponding bromo group (compound **4b**, **4f** versus **4e**). The molecular docking scores of these compounds are in agreement with the observed RT inhibitory activity. These studies further pointed out the scope of pyrimidine-like moieties at C-2 together with steric and electrostatic groups at N-3 positions for anti-HIV-1 RT activity

(compound **7d** and **7f**). Moreover, the MD simulations of **7d** and **7f** with HIV-1 RT provided an insight of the enzyme–compound interactions. These results gave us new idea to design thiazolidin-4-ones as NNRTIs by way of targeting Tyr319 and Val106 with H-bond interactions. As reports indicate the role of mutating Val106 in the appearance of resistance to nevirapine and efavirenz,[c] it is desirable to have compounds to overcome this situation. Compound **7f** identified in this study showed a tendency of H-bond interaction with the backbone of Val106. Introduction of such features in the compounds are useful to overcome the resistance due to mutation of this residue. This may open avenues to explore novel compounds for neutralizing the some drug resistance issues.

Acknowledgments
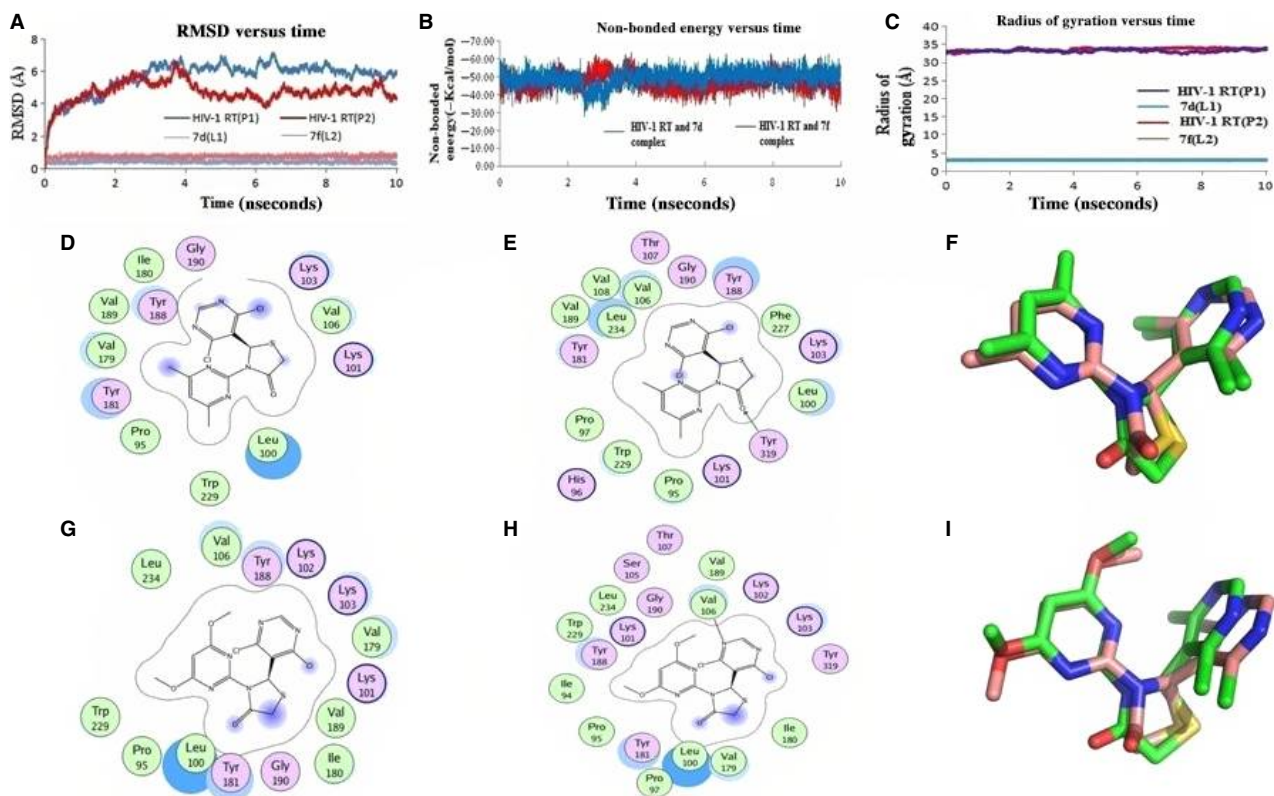
Figure 2: MD simulation profile (10 ns) of compounds **7d** and **7f** docked in 3HVT; A, root mean square deviations (RMSDs) of protein and compounds; B, non-bonded interaction energy of protein–compound complexes; C, radius of gyration of protein and compounds; D and E, 2D representation (before and after the MD simulation) of compound **7d** in the binding pocket; F, superimposed compound **7d** – before (green) and at the end (salmon) of 10 ns MD simulation; G and H, 2D representation (before and after the MD simulation) of compound **7f** in the binding pocket; I, superimposed compound **7f** – before (green) and after (salmon) the MD simulation.

Conflict of interest

The authors declared that this article has no conflict of interest.

References

1. Debnath U., Katti S.B., Prabhakar Y.S. (2013) Graph theory concepts in the rationales of anti HIV-1 compounds. Curr Comput Aided Drug Des;9:472–481.
2. Arts E.J., Hazuda D.J. (2012) HIV-1 antiretroviral drug therapy. Cold Spring Harb Perspect Med;2:a007161.
3. De Clercq E. (2009) Anti-HIV drugs: 25 compounds approved within 25 years after the discovery of HIV. Int J Antimicrob Agents;33:307–320.
4. Pauwels R. (2004) New non-nucleoside reverse transcriptase inhibitors (NNRTIs) in development for the treatment of HIV infections. Curr Opin Pharmacol;4:437–446.
5. Clercq E.D. (2007) The design of drugs for HIV and HCV. Nat Rev Drug Discov;6:1001–1018.
6. Safadi Y.E., Boudou V.V., Marquet R. (2007) HIV-1 reverse transcriptase inhibitors. Appl Microbiol Biotechnol;75:723–737.
7. Clercq E.D. (2004) Non-nucleoside reverse transcriptase inhibitors (NNRTIs): past, present, and future. Chem Biodivers;1:44–64.
8. Esnouf R., Ren J., Ross C., Jones Y., Stammers D., Stuart D. (1995) Mechanism of inhibition of HIV-1 reverse transcriptase by non-nucleoside inhibitors. Nat Struct Biol;2:303–308.
9. Rawal R.K., Murugesan V., Katti S.B. (2012) Structure–activity relationship studies on clinically relevant HIV-1 NNRTIs. Curr Med Chem;19:5364–5380.
10. Clercq E.D. (2005) Emerging anti-HIV drugs. Expert Opin Emerg Drugs;10:241–274.
11. Richman D., Shih C.K., Lowy I., Rose J., Prodanovich P., Goff S., Griffin J. (1991) Human immunodeficiency virus type 1 mutants resistant to nonnucleoside inhibitors of reverse transcriptase arise in tissue culture. Proc Natl Acad Sci USA;88:11241–11245.
12. Barreca M.L., Balzarini J., Chimirri A., De Clercq E., De Luca L., Höltje H.D., Höltje M., Monforte A.M., Monforte P., Pannecouque C., Rao A., Zappalà M.

(2002) Design, synthesis, structure–activity relation-ships, and molecular modeling studies of 2,3-diaryl-1,3-thiazolidin-4-ones as potent anti-HIV agents. J Med Chem;24:5410–5413.

13. Barreca M.L., Chimirri A., De Clercq E., De Luca L., Monforte A.M., Monforte P., Rao A., Zappalà M. (2003) Anti-HIV agents: design and discovery of new potent RT inhibitors. Farmaco;58:259–263.

14. Rao A., Balzarini J., Carbone A., Chimirri A., De Clercq E., Monforte A.M., Monforte P., Pannecouque C., Zappalà M. (2004) 2-(2,6-Dihalophenyl)-3-(pyrimidin-2-yl)-1,3-thiazolidin-4-ones as non-nucleoside HIV-1 reverse transcriptase inhibitors. Antiviral Res;63:79–84.

15. Rawal R.K., Solomon V.R., Prabhakar Y.S., Katti S.B., Clarcq E.D. (2005) Synthesis and QSAR studies on thiazolidinones as anti-HIV agents. Comb Chem High Throughput Screen;8:439–443.

16. Rawal R.K., Tripathi R., Katti S.B., Pannecouque C., Clercq E.D. (2007) Synthesis and evaluation of 2-(2,6-dihalophenyl)-3-pyrimidinyl-1,3-thiazolidin-4-one ana-logues as anti-HIV-1 agents. Bioorg Med Chem;15:3134–3142.

17. Rawal R.K., Tripathi R., Kulkarni S., Paranjape R., Katti S.B., Pannecouque C., Clercq E.D. (2008) 2-(2,6-Dihalo-phenyl)-3-heteroaryl-2-ylmethyl-1, 3-thiazolidin-4-ones: anti-HIV agents. Chem Biol Drug Des;72:147–154.

18. Murugesan V., Tiwari V.S., Saxena R., Tripathi R., Paranjape R., Kulkarni S., Makwana N., Suryawanshi R., Katti S.B. (2011) Lead optimization at C-2 and N-3 positions of thiazolidin-4-ones as HIV-1 non-nucleoside reverse transcriptase inhibitors. Bioorg Med Chem;19:6919–6926.

19. Murugesan V., Makwana N., Suryawanshi R., Saxena R., Tripathi R.K., Paranjape R., Kulkarni S., Katti S.B. (2014) Rational design and synthesis of novel thiazolidin-4-ones as non-nucleoside HIV-1 reverse transcriptase inhibitors. Bioorg Med Chem;22:3159–3170.

20. Murugesan V., Prabhakar Y.S., Katti S.B. (2009) CoM-FA and CoMSIA studies on thiazolidin-4-one as anti-HIV-1 agents. J Mol Graph Model;27:735–743.

21. Smerdon S.J., Jager J., Wang J., Kohlstaedt L.A., Chirino A.J., Friedmant J.M., Rices P.A., Steitz T.A. (1994) Structure of the binding site for nonnucleoside inhibitors of the reverse transcriptase of human immunodeficiency virus type 1. Proc Natl Acad Sci USA;91:3911–3915.

22. Mosmann T. (1983) Rapid colorimetric assay for cellular growth and survival: application to proliferation and cytotoxicity assays. J Immunol Methods;65:55–63.

23. Clark M., Cramer R.D. III, Opdenbosch N.V. (1989) Validation of the general purpose tripos 5.2 force field. J Comput Chem;10:982–1012.

24. Phillips J.C., Braun R., Wang W., Gumbart J., Tajk-horshid E., Villa E., Chipot C., Skeel R.D., Kale L., Schulten K. (2005) Scalable molecular dynamics with NAMD. J Comput Chem;26:1781–1802.

Notes

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Synthetic procedure along with experimen-tal (spectroscopic) data of synthesized compounds.

Figure S1. Dose–response curve for compound **7d** and **7f**.

Figure S2. Binding poses of less active compounds (**7c**, **7j**).

Figure S3. Superimposed poses of nevirapine from dock-ing experiment (cyan) and from the cocrystal structure **1VRT** (green).

Figure S4. Superimposition of ligand **7d** during the dynamic simulation using coloured time-step (VMD).

Figure S5. Superimposition of ligand **7f** during the dynamic simulation using coloured time-step (VMD).

Table S1. *In vitro* kit assay and anti HIV-1 assay methods with %inhibition data at 10 µg/mL and cytotoxicity analysis of synthesized molecules.

Table S2. Binding residues along with binding energies between NNIBP and all synthesized compounds.

Table S3. Binding energies of R and S isomer of all syn-thesized compounds

Video S1. Video of MD simulations of compounds **7d** with protein.

Video S2. Video of MD simulations of compounds **7f** with protein.

Home Page: http://ijppsjournal.org
International Journal of Pharmacology and Pharmaceutical Sciences

Research Article

Pharmacognostic evaluation and determination of appropriate methodology for extraction of important bioactive compounds of *Aerva sanguinolenta leaves*

Sampat Kumar Kundu[1], Dr. Sumana Chatterjee[2*] Dr. Abhijit Sen Gupta[3]
[1,]Research Scholar, Guru Nanak Institute of Pharmaceutical Science & Technology, [2]Professor, Guru Nanak Institute of Pharmaceutical Science & Technology; [3]Director cum Principal, Guru Nanak Institute of Pharmaceutical Science & Technology
*Corresponding Author

Abstract

The objectives of the present investigations are to develop pharmacognostic and physicochemical parameters for identification and standardization of *Aerva sanguinolenta* leaves and comparative study of the effect of different extraction techniques on extractability of tannin, flavonoids and total phenolic compounds. Pharmacognostic study of the leaves was done involving macroscopic, microscopic study and fluorescence analysis of the powdered leaves. The physicochemical parameters like extractive value, ash value etc. was determined. Extraction of the leaves were done using soxhlation, maceration and ultrasound assisted extraction (UAE) at 25^0 C, 45^0C and at 65^0C using initially hexane and followed by ethanol and water as solvents. The stomatal index, palisade ratio and vein islet number of *A. sanguinolenta* leaves were found to be 16, 12 and 6 respectively. Results also showed that ethanolic extraction of leaves using UAE at 25^0 C yielded maximum flavonoid (70.014±0.605 mg per gram of extract).The observations of pharmacognostic studies and that of physico-chemical studies of *A. sanguinolenta* leaves are important document for standardisation of *A. sanguinolenta* leaves. UAE at 25^0C temperature can be used as a method of choice to extract flavonoid from *A. sanguinolenta* leaves.

Key Words: Pharmacognostic, flavonoid, tannin, soxhlet, maceration, ultrasonication, extraction, *Aerva sanguinolenta*

_____

INTRODUCTION

Aerva sanguinolenta Blume, a member of Amaranthaceae family is an erect or rambling perennial shrub or herb found throughout India, Bangladesh, China and Malayasia. In folklore medication, the whole plant is used as tonic, sedative and in dermatitis. The whole plant was used as diuretic and demulcent [1], decoction of tender shoot of the plant as galactogue to nursing mother [2] and decoction of whole plant to expel intestinal worms [3]. The leaves and flowers of the plant are used as wound healing and anti-inflammatory agent for injuries from falls, rheumatic arthritis and muscle pain [4]. The aqueous extract of the whole plant shows significant diuretic and anti-inflammatory activity [5]. Ethanolic extract of this plant shows potent anticancer activity on Ehrlich's Ascites cell induced swiss mice in a dose dependent manner. For the commercial production of herbal preparation, availability of good quality raw material and standard extraction procedure is very important. Adulteration of the raw plant material either by replacement of original plant with another plant material or intentionally adding any foreign substance to increase the weight or potency of the product or to decrease its cost ultimately damage the prepared herbal preparation. Pharmacognostic studies lay down standardization parameters and thus it will help in authentication of the plants and preventing adulterations. Such studies ensure reproducible quality of herbal products which ultimately leads to safety and efficacy of natural products [6].

11

Kundu SK.; et.al. Int. J. Pharmacol. Pharm. Sci. (2015) 2;4; 11-20

Method of extraction significantly influences the nature of bioactive compound extracted. Maceration and soxhlation are traditional methods of extraction and are more frequently used for the isolation of bioactive compounds. Conventional soxhlet extraction is not always acceptable for industrial applications due to long extraction time, large consumption of hazardous solvents and some other disadvantages. [7]. Microwave extraction method has been found to be the best option for the extraction of flavonoids from defatted flowers or leaves of *Cassia angustifolia* amongst five different techniques viz. microwave extraction, soxhlet extraction, sonication extraction, marination extraction and reflux condensation extraction [8]. Ultrasound has high ability to extract phenolic compounds and that is the reason it is being used frequently [9]. After the extraction of *Allium ursinum* leaves by conventional maceration process, higher amount of polyphenolic compounds were obtained, whereas extraction by ultrasonic assisted extraction procedure yielded higher amount of flavonoids [10]. Till now there is neither any report on the pharmacognostic study of *A. sanguinolenta* leaves nor on extraction efficiency and kinetics of any extractive substances (ES) from .*A. sanguinolenta* leaves. In the present study, in the first phase, detailed pharmacognostic study of *A. sanguinolenta* leaves involving macroscopic study, microscopic study, physico-chemical study and fluorescence tests of powdered leaves were done. In the second phase, presence of important bioactive compounds like tannin, phenolic compound and flavonoids were studied in hexane, ethanol and aqueous extracts of *A. sanguinolenta* leaves by qualitative tests. These extracts were prepared by the method of soxhalation. Thereafter, quantitative estimation of these bioactive substances was done on each extract by different biochemical methods. Ethanolic extract showed maximum yield of each bioactive compound studied. So, finally the effect of different extraction methods like conventional maceration, soxhalation and ultrasonic assisted extraction on extracting flavonoids, tannin and total phenolic content from shade dried leaves of *A. sanguinolenta* was investigated. In each case, ethanol was used as the extracting solvent.

EXPERIMENTAL

Collection of Plant Materials

A whole plant was collected from Sodepore, West Bengal and a herbarium was made. It was taxonomically identified from Botanical Survey of India, Howrah -711103, as *Aerva sanguinolenta* having the voucher number CNH/19/2012/TECHII/704.

Pharmacognostic Evaluation of Leaves of *Aerva Sanguinolenta*

Macroscopic and Microscopic Study

Macroscopic study was done by naked eye on fresh leaves and on dry powder. Colour, odour, taste, size and shape of leaf and powder were observed. Microscopic characteristics viz. Vein islet number, palisade and stomatal index were determined using binocular microscope and camera lucida [11].

Physico-chemical Analysis

Different physical constants like total ash value, acid insoluble ash value, water soluble ash value of shade dried leaves of *A. sanguinolenta* were determined as per Indian Pharmacopoeia.

Fluorescence Analysis [12]

For fluorescence analysis, powdered drug was sieved through 60 mesh. About 10 g of powdered drug was taken in petridish and treated separately with different reagents viz., methanol, 1N methanolic sodium hydroxide, ethanol (70% v/v), 1N ethanolic sodium hydroxide, 1N HCl, 50% sulphuric acid, 50% nitric acid and 5% potassium hydroxide, ammonia, acetic acid, ferruc chloride and water. The fluorescence was observed under short UV (254 nm), long UV (365 nm) and visible light.

12

Kundu SK.; et.al. Int. J. Pharmacol. Pharm. Sci. (2015) 2;4; 11-20

Preparation of Extract

Leaves of these identified plants were collected and shade dried at room temperature. After proper drying, the size of the leaves was reduced to coarse powder with the help of grinder and it was passed through the sieve no 40. These powdered leaves were subject to three types of extraction – soxhalation, maceration and ultrasonication. About 100gm of powdered materials was first extracted with hexane to remove oily materials and then with ethanol followed by water using soxhlet apparatus. During extraction using maceration and ultrasonic assisted extraction also same solvents were used in identical order. Ultrasonic assisted extraction was done at three different temperatures – at 25^0C, 45^0C and 65^0C. Each extract was then concentrated and dried using rotary vacuum evaporator. The extracts were then transferred to an air tight container and stored in a freezer at -20^0C till subsequent uses. Each extract was subjected to qualitative standard biochemical test [13]. Aqueous and ethanolic extracts obtained by soxhalation were subjected to quantitative tests for flavonoid [14], total phenolic compounds [14] and tannin [15]. The same set of quantitative estimation was done on ethanolic extracts obtained by maceration and ultrasonic assisted extraction at different temperatures.

Chemicals

Different chemicals viz. Quercetin (SD Fine Chem. Ltd, Mumbai India), Tannic Acid (SD Fine Chem. Ltd, Mumbai India), Catechol (SD Fine Chem. Ltd, Mumbai India), Folin- Ciocalteu reagent (SRL) and other chemicals used for the analysis were of analytical grade.

Total Flavonoid Content (FC) Determination

The total flavonoids content of each plant extract was estimated as per Elija *et. al.*[14] using Jasco V630 double beam UV-VIS spectrophotometer. Standard curve of quercetin was prepared (0-12mg/mL) using same protocol and the results are expressed as mg of quercetin equivalents per gm of extract.

Total Phenolic Content (TPC) Determination

 The total phenolic content in the extract was determined by following the method as described Elija *et. al.*[14] using Jasco V630 double beam UV-VIS spectrophotometer. The calibration curve was prepared using catechol using the same protocol. The phenolic content of the plant is expressed as a mg. equivalent of catechol per gm. of extract.

Total Tannin Content (TC) Determination

Tannins were estimated according to the procedure of Tamilselvi *et al*. [15] using Jasco V630 double beam UV-VIS spectrophotometer. The concentration of tannins in each test sample is expressed as mg of tannic acid equivalent per gram of extract.

RESULT AND DISCUSSION

TABLE I: MACROSCOPIC CHARACTERISTIC OF LEAVES

S. No.	PARAMETERS	OBSERVATION OF LEAVES
1	Shape	Ovate
2	Odour	Characteristic
3	Taste	Bitter
4	Size	0.2-0.7 inch in thickness and 4-8 cm in length
5	Colour	Brownish pink

Figure I: Vein islet number= 7,   Figure II: Stomatal index=17,   Figure III: Palisade Ratio=9

The extractive values, ash values, acid soluble, insoluble ash values and loss on drying are shown in Table II.

Table II: Physico-chemical Constants of *Aerva sanguinolenta* Leaves

Sl. No.	Physico-chemical Constant	Observation
1.	**Ash Value (% w/w)**	
	Total Ash	8
	Acid Insoluble Ash	2
	Water Soluble Ash	8.5
2.	**Extractive Values (% w/w)**	
	n-hexane soluble extractive	2.38
	Chloroform soluble extractive	4.76
	Ethyl acetate soluble extractive.	7.14
	Alcohol soluble extractive.	11.90
	Water soluble extractive	22.5
3.	Loss on Drying (% w/w)	5

It is clear from Table II that on increasing the polarity the extractive value increases. Ash value, extractive value and loss on drying have been found to be 8, 2 and 8.5% w/w respectively.

Many phytoconstituents give fluorescence when sufficiently illuminated. The fluorescence colour is specific for each compound. A non-fluorescent compound may fluoresce in presence of fluorescent impurity. Hence, the fluoresnce analysis of the powdered plant drug is useful for detecting the presence of any adulterants. The leaf powder of *Aerva sanguinolenta* was treated with different chemicals and the fluorescence colour obtained in day light, under long UV light and short UV light observations are shown in Table III.

Table III: Fluorescence Analysis of *Aerva sanguinolenta* Leaf Powder

Treatments	Observation under		
	Day light	*Long UV*	*Short UV*
Powder as such	Light yellow	Light black	Light yellow
Powder+ NaOH (aqueous)	Brown	Brown Fluorescence	Green
Powder+ NaOH (alcoholic)	Green	Green Fluorescence	Light brown
Powder+ H_2SO_4	Brown	Brown Fluorescence	Light brown
Powder+ HNO_3	Pale yellow	Light brown	Light brown
Powder+ HCl	Black	Brownish	Light brown
Powder+ Ammonia	Green	Yellow Fluorescence	Yellow
Powder+ Acetic acid	Black	Black to light Fluorescence	Deep black
Powder+ Iodine	Pale yellow	Yellow	Light yellow
Powder+$FeCl_3$	Light yellow	Yellowish to light Fluorescence	Yellow
Powder+ Water	Green	Brown Fluorescence	Brown

From Table III, it is clear that when the leaf powder was treated with aqueous sodium hydroxide, brown fluorescent colour was obtained when observed under long UV radiation whereas when it was treated with alcoholic sodium hydroxide, green fluorescent colour was obtained. Brown fluorescent colour was also obtained when observed under long UV radiation after the treatment of leaf powder with sulfuric acid. When the leaf powder was treated with ammonia, under long UV radiation, the colour of the leaf powder became fluorescent yellow.

The presence of bioactive compounds like phenolic compounds, flavonoid and tannin in hexane, ethanol and aqueous extracts of *Aerva sanguinolenta* leaves are shown in Table IV.

From Table IV, it is clear that phenolic compounds, flavonoids and tannins were present only in alcoholic and aqueous extracts but were absent in hexane extract. The quantification study was therefore conducted only on ethanolic and aqueous extracts.

Table V shows flavonoid, tannin and total phenolic content of both alcoholic and aqueous extracts of *A. sanguinolenta* leaves obtained by soxhlation. Flavonoid content is expressed in terms of mg of quarcetin equivalent per gram of extract, tannin as mg of tannic acid equivalent per gram of extract and total phenolic compounds as mg of catechol equivalents per gram of extracts. Flavonoid contents of each extract were determined by using the standard plot of quarcetin, y = 0.154x with R^2=0.970. It is clear from Table V that ethanolic extract contained higher amount of flavonoids in comparison to aqueous extract. The flavonoid content of ethanolic and aqueous extract of *Aerva sanguinolenta* leaves was found to be 11.17±0.005 mg and 3.53± 0.525 mg of quarcetin equivalent per gram of extract respectively.

**Table IV: Presence of Phyto-chemicals in Different Solvent Extracts**

Method of Extraction	Solvent of Extraction	Flavonoid		Tannin
		Shinoda Test	Alkaline Reagent Test	Ferric Chloride Test
Soxhlation	Aqueous	+	+	+
	Ethanol	+	+	+
	Hexane	-	-	-
Maceration	Aqueous	+	+	+
	Ethanol	+	+	+
	Hexane	-	-	-
UAE at 25^0C	Aqueous	+	+	+
	Ethanol	+	+	+
	Hexane	-	-	-
UAE at 45^0C	Aqueous	+	+	+
	Ethanol	+	+	+
	Hexane	-	-	-
UAE at 45^0C	Aqueous	+	+	+
	Ethanol	+	+	+
	Hexane	-	-	-

The tannin contents of each extract was determined by using the standard plot of tannic acid, y=0.009 x with R^2=0.984. The ethanolic extract was found to contain 0.942±0.007 mg of tannin whereas aqueous extract contained only 0.572±0.0008 mg of tannin.

The total phenolic content of each extract was determined by using the standard plot of catechol, y=0.035x-0.011 with R^2=0.981. The total phenolic contents of ethanolic and aqueous extract of *Aerva sanguinolenta* leaves were found to be 1.66 ±0.099 mg and 0.574 ± 0.020 mg respectively. Total Phenolic content, Tannin content and Flavonoid contents of both ethanolic and aqueous extracts of *A. sanguinolenta* leaves are shown in Figure IV to represent a comparative yield of these bioactive compounds in different extracts.

Table V: Phytochemical Constituents of Aquoeus & Ethanolic Extract of *A. sanguinolenta* Leaves Obtained By Using Soxhlation

Extract	Flavonoid Content (mg of quarcetin equivalent per gram of extract)	Tannin Content (mg of tannic acid equivalent per gram	Total Phenolic Content (mg of catechol equivalent per gram of extract)
Aqueous	3.53± 0.525	0.572±0.0008	0.574 ± 0.020
Ethanol	11.17±0.05	0.942±0.007	1.66 ±0.099
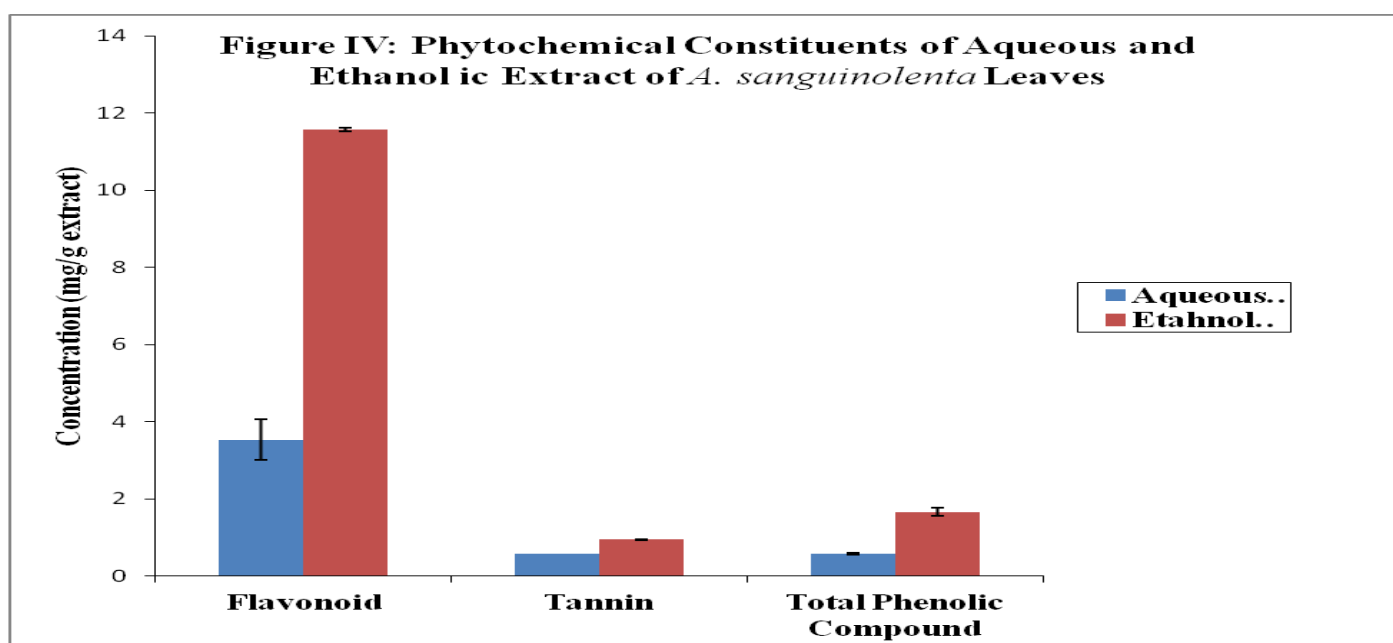
Above study clearly indicates that ethanolic extract of *A. sanguinolenta* leaves is richer in bioactive constituents studied. Flavonoid, tannin and total phenolic compounds were then extracted by different extraction techniques like maceration and ultrasonication assisted extraction using alcohol as the solvent. The phyto-chemical screenings of these extracts shown in Table IV indicates that hexane extract does not contain flavonoid or tannin. However, all the bioactive constituents studied were present in both aqueous and ethanolic extracts obtained after soxhation, maceration, UAE at 25^0C, 45^0C and at 65^0C.
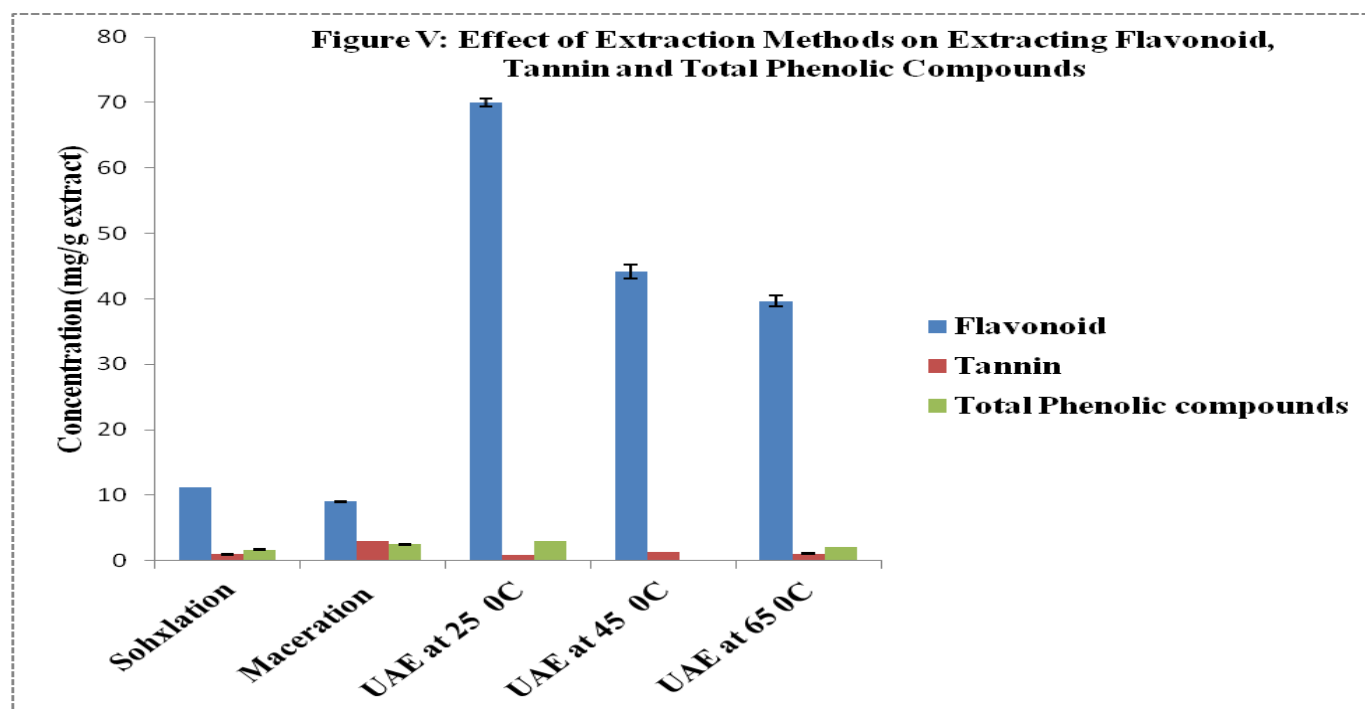
The results shown in Table VI clearly demonstrate that irrespective of the method of extraction, each alcoholic extract was richer in flavonoid. .

In order to compare the extraction capability of different extraction procedure to extract flavonoid, tannin and phenolic compounds from *A. sanguinolenta* leaves using alcohol as solvent, the observations tabulated in Table VI are plotted graphically in Figure V. Maximum yield of flavonoid (70.014±0.605 mg of quarcetin equivalent per gram of extract) was obtained when *A. sanguinolenta* leaves were extracted by UAE at 25^0C. Total phenolic content was found to be very insignificant when extraction was done by ultrasound assisted extraction procedure at 45^0C. However, this method offered best yield of tannin in comparison to sohxlation and maceration. Maceration technique extracted maximum phenolic compounds in comparison to the other methods. All the p values calculated excepting in the case of UAE at 65^0C were found to be highly significant ($p<0.01$) when compared to soxhlation. The p value for the extraction using UAE at 65^0C was found to be significant ($p<0.05$) when compared to soxhlation.

Soxhlation is only suitable for thermostable constituents .Among the three methods studied, UAE is least time consuming and this method is suitable for extraction of thermo labile substances.

Table VI: Total Phenolic, Flavonoid and Tannin content of Ethanolic Extract of _A. sanguinolenta_ Leaves Prepared by Sohxlation, Maceration & UAE

Method	Flavonoid Content (mg of quarcetin equivalent per gram of extract)	Tannin Content (mg of tannic acid equivalent per gram of extract)	Total Phenolic Content (mg of catechol equivalent per gram of extract)
Soxhalation	11.17±0.005	0.942±0.007	1.66±0.099
Maceration	8.99±0.07	2.94±0.027	2.47±0.036
Ultrasound Assisted Extraction at 25^0 C	70.014±0.605	0.829±0.003	2.99±0.037
sUltrasound Assisted Extraction at 45^0 C	44.14±1.022	1.33±0.005	0.126±0.042
Ultrasound Assisted Extraction at 65^0 C	39.66±0.89	1.08±0.09	2.11±0.033

Figure V: Effect of Extraction Methods on Extracting Flavonoid, Tannin and Total Phenolic Compounds

CONCLUSION

Pharmacognotic studies of *A. sanguinolenta* leaves indicate that the stomatal index, palisade ratio and vein islet number of the leaf are 17, 9 and 7 respectively. Amongst soxhlation, maceration and ultrasonication at 25^0C, 45^0C and 65^0C, UAE at 25^0C temperature has been found to be the best method for extraction of flavonoid using ethanol as the solvent. UAE at 25^0C is highly appreciable for thermolabile compounds and pure ethanol has less toxicity than methanol as solvent. Further purification to isolate the pure compound will yield a pharmacologically important biomolecule.

ACKNOWLEDGEMENT

CONFLICT OF INTEREST

No conflict to disclose.

REFERENCES

1. Adhikari BS, Babu MM, Saklani PL, Rawat GS. Medicinal plants diversity and their conservation status in wildlife institute of India (WII) campus, dehradun. *Ethnoleaflets* 2010; **14**: 46-83.

2. Buragohain J.Folk medicinal plants used in gynecological disorders in Tinsukia district, Assam, India. *Fitoterapia* 2008; **79**: 388–392.

3. Kosalge SB, Fursule RA. Investigation of ethnomedicinal claims of some plants used by tribals of Satpuda Hills in India. *J. Ethnopharmacol*. 2009; **121**: 456–461.

4. Sumei L, Chunlin L, Fengyan L, Sangwoo L, Guo Q, Rong L, Yuheng L.. Herbs for medicinal baths among the traditional Yao communities of China. *J. Ethnopharmacol*. 2006; **108**: 59–67.

5. Dhar ML, Dhawan BN, Mehrotra BN, Ray, C..Screening of Indian medicinal plants for Biological acitivity. *Ind. J Expt. Biol.* **1968; 6**: 232-247.

6. Chanda S.Importance of Pharmacognostic study of medicinal plants: An overview. *J. Pharmacog. Phytochem*. 2014; **2**: 69-73.

7. Rodríguez-Rojo S, Visentin A, Maestri D. Cocero M. Assisted extraction of rosemary antioxidants with green solvents. *J. Food Engg*. 2012; **109**: 98–103.

8. Laghari AQ, Memon S, Nelofar A , Laghari AH. Extraction, Identification and Antioxidative Properties of the Flavonoid-Rich Fractions from Leaves and Flowers of Cassia angustifolia. *Am. J. Anal Chem* 2011; **2**: 871-878.

9. Shirsath S, Sonawane S. Gogate P. Intensification of extraction of natural products using ultrasonic irradiations—a review of current status. *Chem.Eng. Proc. Inten.* 2012; **53**:10–23.

10. Gitin L., Dinică R., Parnavel R.. The Influence of Extraction Method on the Apparent Content of Bioactive Compounds in Romanian *Allium* spp. Leaves. Not *Bot. Horti. Agrobo*. 2012; **40**: 93-97.

11. Lohar, DR Protocol for Testing; Department of AYUSH, Ministry of Health & Family Welfare, Pharmacopoeial Laboratory for Indian Medicines Publication, Ghaziabad, 45-47.

12. Himaja, M. Trivedi, S. Mohana L, Jyothi MJ.. Pharmacognostic studies of the leaves of *Ficus nervosa* Heyne ex Roth (Moraceae), *Int. J. Phytother*. 2012; **2**:16-22.

13. Periyasami AK, Raj Kumar, Mahalingam K. Phytochemical Screening and antimicrobial activity from five Indian medicinal plants against human pathogens. *Mid East. J. Sc. Res.* 2010; **5**:157-162.

19

Kundu SK.; et.al. Int. J. Pharmacol. Pharm. Sci. (2015) 2;4; 11-20

14. Khatiwora E., Adsul VB, Kulkarni MM. Deshpande NR, Kashalkar, RV. Spectroscopic determination of total phenol and flavonoid contents of *Ipomoea carnea*. *Int J Chem Tech Res*. 2010; **2**: 1698-1701.

15. Tamilselvi N, Krishnamoorthy, P, Dhamotharan R, Arumugam P, Sagadevan E. Analysis of total phenols, total tannins and screening of phyto components in *Indigofera aspalathoides* (Shivanar Vembu) Vahl EX DC. *J. Chem. Pharm. Res.* 2012; **4**: 3259-3262.

20

Kundu SK.; et.al. Int. J. Pharmacol. Pharm. Sci. (2015) 2;4; 11-20

PROCEEDINGS IN NATIONAL AND INTERNATIONAL CONFERENCES

2015

LIST OF PROCEEDINGS IN NATIONAL OR INTERANTIONAL CONFERENCES, 2015:

Sl No.	Title of the Abstract	Authors' Names	Title of the Conference	Date	Venue
1.	Effect of extraction techniques on the yield of flavonoid, phenolic and total tannin content of ethanolic extract of *A. sanguinolenta*	**S. K. Kundu , S. Chatterjee, A. Sengupta.**	2nd International Congress of Society for Ethnopharmacology	Feb 20-22, 2015	Nagpur
2.	Dietary Phytomolecules significantly reduce oxidative stress of mononuclear cells of patients with Rheumatoid Arthritis: An *ex vivo* study	**Asis Bala,** Purbajit Chetia, Mainak Chakraborty, Bidita Khandewal , P.K. Haldar	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata
3.	*In vitro* Antioxidant activity of Aerva sanguinolenta leaves obtained after different extraction process	**Sampat Kumar Kundu, S. Chatterjee, A. SenGupta**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata

4.	Extraction and characterization of mucilage from the fruits of *Basella Alba L.* and its comparative study	**Moumita Chowdhury, Abhijit Sengupta, Sumana Chatterjee.**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata
5.	Modeling the Biomass Growth and Enzyme Secretion by the White Rot Fungus *Phanerochaete chrysosporium*: a Stochastic-Based Approach	**Kausik Sen ,** Kannan Pakshirajan, S. B. Santra	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata
6.	Design of pharmacophore acting on the different Glucose transporter systems in body	**Sourav Pal, Kausik Sen, Abhijit SenGupta, Sriparna KunduSen**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata
7.	Evaluation of Antihyperglycemic Activity of *Citrus limetta* Fruit Peel in Streptozotocin-Induced Diabetic Rats	**Sriparna KunduSen, Prerona Saha**, Malaya Gupta, Upal K. Mazumder, Pallab K. Haldar	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata

8.	Safety of Herbal Medicine: From prejudice to evidence	**D. Ghoshdastidar**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata
9.	Medicinal orchids of Darjeeling and Sikkim Himalaya as modern culture of Ethnopharmacological research.	S. Tuladhar, **A. Bala**	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata
10.	A review on Natural herbs in the treatment of hypertension.	**Samrat Bose**, K. Mitra	2nd National Convention of SFE on Integrated approaches for Promotion and development of Herbal medicine	Dec 5-6, 2015	Jadavpur University, Kolkata
11.	Effect & Toxicity relationship to fish production & human health: Implication for management waste water in East Kolkata Wetland.	**Swati Chakraborty**	Frontier in Modern Biology 2015	Dec 5-6, 2015	IISER, Kolkata