

INFORMATION BROCHURE
SLIET ENTRANCE TEST (SET)-2016

FOR
ADMISSION TO

DOCTOR OF PHILOSOPHY (Ph.D)
(Even Semester session 2015-16)
[SET-V]



SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY (SLIET)
(Deemed University)
LONGOWAL (DISTRICT SANGRUR) – 148106 (PUNJAB) INDIA
(Estd. by Ministry of Human Resource & Development, Govt. of India)

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Application Fee for SLIET Entrance Test:

For Admission to Ph.D. Programmes, the Application Form can be downloaded from the Institute website www.sliet.ac.in

The duly filled-in Application Form should be submitted alongwith a Fee of Rs. 1200/- (Rs. 800/- for girls & Rs.600/- for SC/ST Candidates). The Fee can be deposited by any of the following means:

(i) By Cash at Accounts Section Cash Counter at SLIET, Longowal

OR

(ii) By Demand Draft in favour of "DIRECTOR SLIET" payable at Longowal / Sangrur

(Demand Draft should be preferably of Central Bank of India OR State Bank of India OR Oriental Bank of Commerce OR Punjab National Bank OR State Bank of Patiala OR ICICI Bank).

IMPORTANT INFORMATION FOR SET-2016

IMPORTANT INSTRUCTIONS

1. The Application Form complete in all respects must reach the Office of Chairman, SLIET Entrance Test (SET) by **15 December, 2015**.
2. The Application Form can be submitted in person at Institute Counter along-with requisite Fee (in the shape of Cash Receipt or Demand Draft as mentioned above)

OR

The Application Form with requisite Fee can also be sent through **Registered Post/Speed Post** to :

**THE CHAIRMAN, SLIET ENTRANCE TEST (SET)-2016,
SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY (SLIET),
LONGOWAL – 148 106, DISTRICT SANGRUR (PUNJAB).**

DO NOT SEND THE APPLICATION FORM BY ORDINARY POST / COURIER.

IMPORTANT DATES

-	Last Date for applying	:	Dec 15,2015 (Monday)
-	Date of Entrance Test (SET-V)	:	Jan 02, 2016 (Saturday)
-	Display of list of qualified Candidates	:	Jan 06,2016(Wednesday)
-	Presentation of Research Proposal/interview	:	Jan 08, 2016 (Friday)
-	Declaration of Final Result	:	Jan 12, 2016 (Tuesday)

** Dates for Counselling / Documents Verification are tentative/provisional*

Commencement of Classes for Ph.D. : Jan 15, 2016 (Friday)

CHECK LIST

Following must be checked while sending the Application Form:

1. Application Form	Yes/No
2. Bank Draft / Cash Receipt	Yes/No
3. Photographs pasted at proper places (on Application Form & Admit Card)	Yes/No
4. Declaration signed	Yes/No
5. Mobile No.	Yes/No
6. Email id	Yes/No

For any Information Contact:

Dr. P.S.Panesar

Vice Chairman, SET-2016

Dr. Harish Kumar Chopra

Chairman, SET-2016

Tel. No. 01672-280072, 253135, 253136

Fax No. 01672-280072, 280057

Email: chairmanset2016@gmail.com

Entrance Examination (Even Semester Session 2015-16)

Ph.D. programmes

02.1.2016 (Saturday) from 14.30-16.30 Hours

THE INSTITUTE

1.1 INTRODUCTION

Sant Longowal Institute of Engineering & Technology (SLIET), established by the Government of India, provides technical education in emerging areas of Engineering & Technology. It caters to the requirement of technical manpower at various levels by adopting the concept of modular system in imparting technical education with emphasis on practical training in industry. Set up in 1989 under Rajiv Gandhi - Longowal accord with an aim to fulfil the cherished dreams of late Sant Harchand Singh Longowal, the Institute has carved for itself a niche place among the professional Institutes and Universities of the country. The Institute is fully funded by Ministry of Human Resource Development, Government of India. The educational programmes of this institute are non-conventional, innovative, practical oriented and contain all aspects of new education policy (1986) of Govt. of India. The Institute offers programmes at Certificate, Diploma, Degree, Post-graduate (M.Tech., MBA and M.Sc.) and Ph.D. level in Science, Humanities, Management, Engineering and Technology. The M.Tech. Programmes were started in the Institute in 2002.

Spread in and sprawling over more than four hundred acres of land, the institute is wonderfully blessed with natural beauty, greenery, serene and pollution free atmosphere. It expresses through refreshing shades the environment and conditions truly designed to give the human being true satiety and comfort. Large plantations carried out at the institute make the institute an everlasting beauty. Live atmosphere is conducive to work environment, brings a human face and gives softening touch to the surroundings. Campus has water bodies and is a paradise for bird watchers.

Institute plays a host to a number of migratory birds giving the glimpse of some of the rarest species in the world. Splendor of the natural environment and beauty of the birds are the perfect setting for better learning in natural environment. It provides an atmosphere wherein a person becomes free from worries, converges his/her desires and start thinking and analyzing for making him/her physically fit, ethically strong and academically sturdy.

Enough avenues for channelizing youth energy in extracurricular activities such as: NSS, NCC, Industrial visits, Educational tours, reading rooms, departmental societies, SPICMACAY chapter, Technical & Cultural festivals, night playing facilities, eating points during the extra hours.

It has self contained campus facilities (Hostel, accommodation, academics, sports, shopping etc.) at par with IITs, NITs, IIMs and other CFTIs. The Institute has acquired the status of Deemed University in the year 2007 (Notification No.F.9-42/2001-U.3). In its Silver Jubilee year, Institute has taken a giant leap by introducing a new academic structure from the session 2014-15. The details of the new academic structure are given in the next section.

The candidates may visit Institute website www.sliet.ac.in for complete details about the Institute.

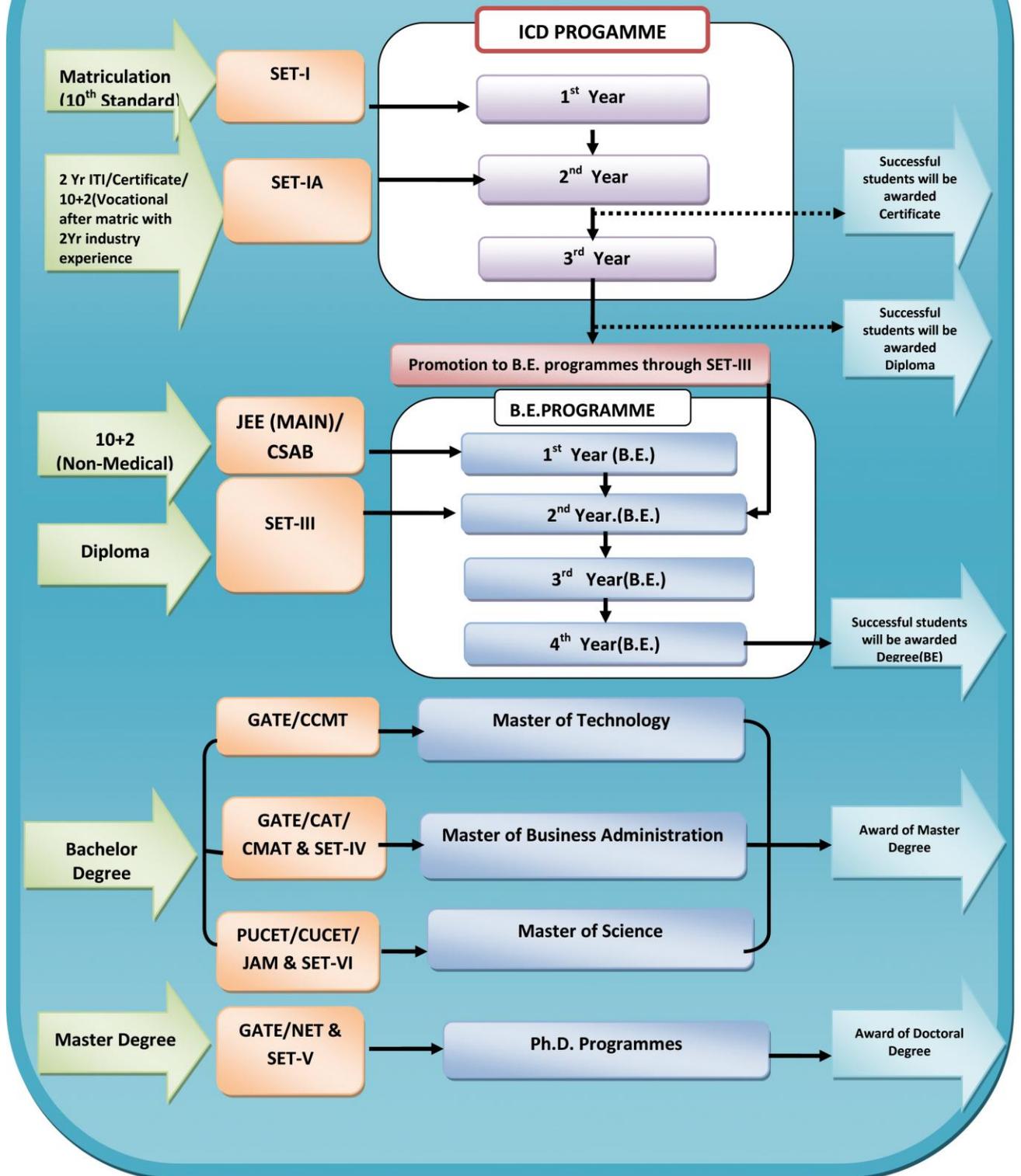
1.2 ACADEMIC STRUCTURE

SALIENT FEATURES:

- Admission to ICD (Integrated Certificate-Diploma) programme (3-Yr) through All India SLIET Entrance Test (SET) after matric/10th standard exam from a recognised Board/University (Pass in English, Mathematics and Science is compulsory).
- Provision of voluntarily exit after successfully completing 2 years (with requisite number of credits) of ICD Programme. The student will be awarded certificate equivalent to 10+2 (PU Chandigarh, Punjab School Education Board & MHRD)
- Provision of entry in 2nd year of ICD after ITI/Certificate with two years industrial experience.
- Diploma will be awarded to students who will complete 3 years of ICD with the prescribed credits as per teaching scheme successfully.
- 50% of the SLIET Diploma holders fulfilling the requisite criteria will be promoted to 2nd year of B.E.(4-Yr) on the basis of all India Entrance Test (SET) conducted by SLIET longowal.
- Few seats in the 2nd year of B.E.(4-Yr) are open for Diploma holders from any recognized institute of India

In the new academic structure students will spend 6 years (3-Yr. in ICD + 3-Yr. in B.E.) to complete graduation programme in Engineering & Technology after 10th standard.

Academic Structure at SLIET Longowal



1.3 OBJECTIVES

The objectives of the Institute are:

(a) Education and Training:

- (i) To offer flexible, modular, layered, multipoint entry/exit programmes in Engineering & Technology,
- (ii) To promote "Self-employment" in all programmes by introducing a component of entrepreneurship & providing guidance and counselling services to help students to take-up self employment ventures,
- (iii) To offer non-formal programmes in different areas of technology to strengthen the scope of Institutional programmes,
- (iv) To provide Technical Education facilities for women, through specially designed courses,
- (v) To offer continuing education programmes for working personnel from industries at different levels,
- (vi) To meet the requirements of small, medium and large scale industries,
- (vii) To offer higher level programmes after acquiring necessary competence at lower level programmes of the Institute,
- (viii) To provide non-formal education and training to persons from unorganized sectors and school drop-outs through its extension services, to enable them to acquire basic technical skills, so that they are successfully employed.

(b) Extension Services:

To offer services to:

- (i) Industries in the neighborhood and in the region
- (ii) Working personnel
- (iii) Passed out students
- (iv) I.T.I.'s and Polytechnics
- (v) Research and other institutes of higher learning

(c) Research & Development:

- (i) To conduct exploratory research to assess manpower requirement leading to integrated educational planning, curriculum development & instructional material development in the identified areas of Science & Technology.
- (ii) To conduct research in the inter-disciplinary areas aimed at solving the problems of industry and community. The concept of practice school introduced in the Institute, will enable the students to attain the knowledge of modern technology practices in the Industries within reasonable time frame.

(d) Collaborations:

Number of M.O.U.'s with reputed industries and institutes of higher learning have been signed and some more are in pipe-line, for the purpose of drawing the expertise available with them, for the overall development of the Institute.

1.4 STATUS

The Institute is an autonomous body having the status of Deemed University and fully funded by the Government of India. It is controlled by SLIET Society, registered under Societies Registration Act, 1860. The Institute awards its own Certificates, Diplomas and Degrees including M.Tech., MBA, M.Sc. and Ph.D. Further, it is clarified that:

- (a) The courses run by SLIET are duly approved by AICTE / UGC.
- (b) Certificates awarded by SLIET were recognized by All India Council for Technical Education (A.I.C.T.E.), New Delhi (Letter No.F,765-65-031(E)/ET/97 dated July 4, 1997 and Letter No.F-765-65/ ET/97 dated April 15, 1997). Certificate courses of SLIET are equivalent to 10+2 qualification. Panjab University, Chandigarh vide its letter No.ST/8374 dated 21.9.1999 has recognized the Certificate courses of SLIET for the purpose of admission to B.A./B.Sc./B.C.A. courses (1st year). Department of Technical Education & Industrial Training, Govt. of Punjab, Chandigarh vide its Memo No.13/23/05-1 T.S.2/32 dated 4.1.2006 has recognized Certificate Course of SLIET equivalent to 10+2. According to the notification, SLIET students are eligible for the admission to B.E./B.Tech. Programmes of Punjab Technical University, Jalandhar (state-wise).Vide notification no. Notification 42 No.F 18-8/93 T.D.V./T.S. IV dated March 8, 1995, the certificate courses are declared as equivalent to 10+2 for job purpose.
- (c) 3 year Integrated Certificate Diploma (ICD) courses were started from the session 2014-15.
- (d) Two Year Diploma Courses were recognized by AICTE, New Delhi vide F.No. North-West/1-201645070/2014/EOA Dated 04/06/2014. Diploma Courses of SLIET are equivalent to the Diplomas awarded by the various State Boards of Technical Education in the appropriate fields for the purpose of recruitment to the posts and services under Central Government (Notification 42 No.F 18-8/93 T.D.V./T.S. IV dated March 8, 1995). Diplomas awarded by SLIET (except Diploma in Computer Science & Engineering) are exempted from Section-A of AMIE by The Institution of Engineers (India) vide letters No.EEA/AKG/R-22A dated Feb 20, 1995; EEA/AD/R-22A dated July 23, 1996 and EEA/AKG/R-22A dated November 1, 1999.

- (e) B.E. (4-Yr) Courses were started from session 2014-15.
- (f) M.Tech. Courses were recognized by AICTE, New Delhi vide F.No. North-West/1-201645070/2014/EOA Dated 04/06/2014.
- (g) M.Sc. (Physics, Chemistry & Mathematics) is approved by the UGC, New Delhi vide letter no. F 6.66/2004 (CPP-I) dated 04 March, 2011.

1.5 LOCATION

The Institute is situated at Longowal (about 8 km from Badbar on Chandigarh-Bathinda Highway) in the District of Sangrur, Punjab. It is well connected by road with Sangrur (18 km), Ludhiana (100 km), Chandigarh (150 km) and Delhi (360 km). The nearest railway stations are Sangrur (18 km), Dhuri (30 km) & Sunam (16 km) on the Northern Railway. The nearest airports are at Chandigarh and Ludhiana.

1.6 FACILITIES

Spread in and sprawling over more than four hundred acres, Institute is wonderfully blessed with natural beauty and greenery. It expresses through refreshing shades revealing the environment and conditions truly designed to give the human spirit true satiety and comfort. Large plantations carried out at the Institute make the Institute a living beauty, a sign of endless and inexhaustible plenty. Live atmosphere enhances working environment bringing a softening, humanizing touch to the surroundings. Institute plays host to a number of migratory birds giving the glimpse of some of the rarest species of birds in the world. Splendor of the natural environment and beauty of the birds are the perfect setting for a spiritual and academic aesthete. Institute provides an atmosphere which means oneself away from the worries, converging desires promoting the values of thinking and analysis. While a cool shade never fails oneself, a nice and comfortable well-equipped guest house adds to the charm of staying at the Institute. Dotted with green parks, strolling areas, gymnasium, swimming pool, herbal nursery, a lake with a created home for doves, the Institute is a mini-paradise extending a warm welcome and symbolizes the 'Modern Gurukul' of 21st Century. All modern facilities to the residents in the campus are available.

(a) Hostels :

SLIET is a residential campus with ten hostels for boys and four for girls, accommodating about 3400 students which include about 1000 girl students. The hostels have been provided with proper kitchens, comfortable dining halls and indoor games facilities, Wi-Fi Internet connectivity, Newspapers / Magazines and Cable T.V. facilities. Hostel facility shall be provided to the students subject to availability and preference will be given to those students whose hometown's distance from the institute will be more. Girl students (including Ph.D. Scholars) will be considered for accommodation only in Girls Hostels. All the hostellers will have to maintain discipline and will abide by the rules framed by office of Dean(SFW) from time to time.

(b) Teaching Departments & Workshop:

The Institute has well-established departments of:

- i. Computer Science & Engineering
- ii. Electronics & Communication Engineering
- iii. Electrical & Instrumentation Engineering
- iv. Mechanical Engineering
- v. Civil Engineering
- vi. Chemical Engineering
- vii. Food Engineering & Technology
- viii. Physics
- ix. Chemistry
- x. Mathematics
- xi. Management and Humanities
- xii. Disability Studies

All the departments have well qualified faculty and supporting staff with laboratories equipped with the modern equipments. A modern workshop has been set up. An exhaustive practical training is imparted to the students to develop their working skills in well equipped workshops.

(c) Central Library:

The Central Library is housed in a modern building having all kinds of facilities for its best utilization by the faculty, staff and students. The Central Library is having large number of volumes of technical books along with a good collection of books on literature, general awareness, management, social sciences and humanities. The central library is subscribing 15 daily newspapers, numerous national and international magazines & periodicals. The faculty, staff and students have access to the full text of journals from Science Direct, ASTM standards & Digital Library, MathSciNet, subscribed by the Central Library. The Central Library is INDEST Consortium member and through INDEST, the faculty, staff and students have online access to the full text of journals from IEEE, Springer, ASME, ASCE, ACM and Nature etc. The NPTEL lectures had been added to the collection, these lectures can be viewed online within the campus. The Central library is under CCTV surveillance. Central library has established a book bank and students will be issued books for the whole semester subject to availability.

(d) Computing Facilities:

The Institute is equipped with latest and powerful hardware & software. The computer laboratories provide computing environment (Linux and Windows Platforms) to the students and faculty for the pursuit of academic excellence. The various software are catering to the need of students such as Oracle 10g, Power Builder, Developer 2000, Visual Basic, .Net, Qualnet etc. and hardware such as IBM Blade Server, IMB xSeries Server, Acer G510 series Server, workstations and PCs are available. The computer laboratories are also equipped with high end printers, plotters and scanners. All servers, PCs and peripherals are connected to the campus-networking for sharing the resources. Academic Blocks, Administrative Block, other Institute Buildings and all hostels are connected through optical fiber to share the resources and exchange the data.

(e) Health Centre:

The Institute has its own Health Centre to provide necessary medical aid to the students and staff in the campus. Apart from the Medical Officers, specialists are also approved as AMA's for providing consultation to the residents. Ambulance facility is available round the clock to shift the serious patients to the nearby hospitals.

(f) Bank, Post Office, Telephone Exchange and Shopping centre

A fully computerized branch of Central Bank of India with ATM facility and a post office are functioning in the campus to cater the needs of the faculty, staff and the students. STD payphone and cyber café facilities are available in the campus. A 800 line EPABX internal telephone facility is available in the institute. Each hostel has been provided with a telephone facility. A moderate shopping centre has been set-up to cater the needs of the residents. All major players of mobile companies have established their network around the campus.

(g) Sports

Adequate provisions for extra-curricular activities are available in the institute. At present, facilities are available for Table Tennis, Badminton, Swimming, Volley-Ball, Football, Hockey, Cricket, Basketball, Lawn Tennis and other indoor games. 400 meters Athletic Track is also available. Night playing facility is also there in the playgrounds.

(h) Students Activity Centre

A modern Students Activity Centre (SAC) has 02 Squash courts, Gymnasium equipped with latest Physical Fitness Machines, indoor games such as Table Tennis, Chess & Carom etc. and is fully functional.

(i) Extra Curricular Activities:

Students are encouraged to participate in extra curricular activities. Music and Hobbies clubs are functioning very effectively. Literary society is organizing various literary activities from time to time. Almost all the departments have their own technical societies which organize technical seminars,

quizzes and other competitions in the departments to give a thrust to the development of academic potential of the students. NSS & NCC units have also been rendering valuable service by inculcating the habits of social & national responsibilities amongst the students. The NSS unit also organizes the Blood Donation camps at SLIET Health Centre. ISTE-SLIET Students Chapter organizes a number of events on various aspects of personality and skill development and other areas of student's interest.

(j) Curriculum Development Cell:

The Institute has its own Curriculum Development Cell and Resource Centre for production of teaching aids and systemic development of curriculum to suit the requirements of industry.

(k) Equal Opportunities Cell:

The equal opportunities cell has been established in the institute to oversee the effective implementation of policies and programmes for deprived group [SC's, ST's, OBC's (non-creamy layer, minorities)] as per Government of India guidelines, in order to enhance their employability and to provide the guidance.

(l) Internet:

At present the Institute has dedicated 01 Gbps internet connectivity for the benefit of the students and faculty. Internet facility has been extended to various Academic Blocks, Administrative Block, hostels and other Institute Buildings through campus wide networking.

(m) Training and Placement Cell:

A centralized department of Training & Placement is established in SLIET, Longowal to meet its student's placement and industrial training requirements. The department is keeping strong liaison with reputed industries to provide placement opportunities and impart industrial training to the students of Institute. The department also provides the inputs on soft skills, personality development, leadership, motivation and communication skills etc. to the students in order to meet the expectations of the industry. A good number of industries conduct campus placements at the institute. The department is having state-of-the-art infrastructure viz. a group discussion room, interview room and a seminar hall. TCS, iGate-Patni, M&M, L&T Infotech, Birlasoft, Infosys, Trident India, ISGEC Yammananagar, Punj Lloyd, Honda Siel Cars India Ltd., ESSAR, CIMCOO, J.P. Group of Industries, Nestle, Hindustan Unilever, SANMAR Group of Industries, L&T, Godrej and Boycee Mfg. Co., Sona Koya, i-Tech Vardhman etc. are some of the recruiting industries of SLIET students through Campus Placement.

1.7 THE FACULTY AND ADMINISTRATION

The Faculty of the institute is the core of the academic programme and guardian angle of maintaining the highest academic standards. Several academic distinction – honours and awards, fellowships of professional societies, books and monographs, patents have been bestowed on our faculty in recognition of their academic achievements. The institute is administrated by dynamic team of Director, Deans and Head of the Departments and Section Incharges.

<p>DIRECTOR V.K.Jain, Ph.D.</p> <p>DEANS Pardeep Gupta, Ph.D., Dean (P&D) M.B.Bera, Ph.D., Dean (Academics) A.S.Arora, Ph.D., Dean (SFW) Rajesh Kumar, Ph.D., Dean (R & C)</p> <p>DEPARTMENT OF CHEMICAL ENGINEERING</p> <p>Professors: H. R. Ghatak, Ph.D. Kamlesh Kumari, Ph.D. (on Deputation) Pushpa Jha, Ph.D. Sandeep Mohan Ahuja, Ph.D. (H.O.D.)</p> <p>Associate Professors: Avinash Thakur, M.E. Gulshan Kumar Jawa, M.E.</p> <p>Assistant Professors: A.S.K. Sinha, M.Tech. Naveen Kumar Kaushley, M.Tech. Nikhil Prakash M.Tech., Ph.D. Subita Bhagat, M.Tech. Vinay Kumar, Ph.D. Vinod Kumar Meena, M.E.</p> <p>DEPARTMENT OF CHEMISTRY</p> <p>Professor: B.K. Kanungo, Ph.D. Dhiraj Sud, Ph.D. Harish Kumar Chopra, Ph.D. (H.O.D.) Ram Pal Chaudhary, Ph.D.</p> <p>Associate Professors: Damanjeet Singh Cannoo, Ph.D.</p> <p>Assistant Professor: Hemant Kumar, Ph.D. Himanshu Rani, M. Phil. Payal Malik, Ph.D.</p> <p>DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING</p> <p>Associate Professors: Birmohan Singh, M.E. Damanpreet Singh, M.S. (H.O.D) Gurjinder Kaur Cheema, M.S. Major Singh Goraya, Ph.D. Manoj Kumar Sachan, Ph.D.</p> <p>Assistant Professors: Jaspal Singh, M.Tech. Manminder Singh, M.Tech. Vinod Kumar Verma, M.S.</p>	<p>DEPARTMENT OF ELECTRICAL & INSTRUMENTATION ENGINEERING</p> <p>Professors : Ajat Shatru Arora, Ph.D. Jaspreet Singh Dhillon, Ph.D. (H.O.D.) Sanjay Marwaha, Ph.D. Vijender Kumar Jain, Ph.D.</p> <p>Associate Professors: Anshuka Bansal, M.Tech. Asim Ali Khan, M.Tech. Charanjiv Gupta, M.E. Diljinder Singh, M.E. Gurmeet Singh, M.E. Manpreet Kaur, M.Tech. Manpreet Singh Manna, M.E.(On Deputation) Pratibha Tyagi, M.Tech. Rajinder Kaur, M.Tech. Sanjeev Singh, Ph.D. Surita Maini, M.E., Ph.D.</p> <p>Assistant Professors: Ashwani Kumar Aggarwal, Ph.D. Manmohan Singh, M.E. Raj Kumar Garg, M. Tech.</p> <p>DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING</p> <p>Professor: Amar Partap Singh Pharwaha, Ph.D. Anupma Marwaha, Ph.D. Jagpal Singh Ubhi, Ph.D. (H.O.D) Surinder Singh, Ph.D.</p> <p>Associate Professors: Ajay Pal Singh Chauhan, M.E. Dilip Kumar, Ph.D Lakhvinder Singh Solanki, M.E.</p> <p>Assistant Professors: Alka Singla, M.Tech. Jatinder Singh, M.Tech. On lien Pankaj Kumar Das, M.Tech. Sarabjeet Singh, M.Tech. Susanta Kumar Tripathi, M.Tech. Vipul Singhal, M.Tech.</p> <p>DEPARTMENT OF DISABILITIES STUDIES Arvind Jayant, M.Tech. (H.O.D.)</p>
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DEPARTMENT OF MANAGEMENT & HUMANITIES**Professor:**

Japreet Kaur Bhangu, Ph.D.
Mahesh Kumar Arora, Ph.D.
Pardeep Kumar Jain, Ph.D.
Parveen Kaur Khanna, Ph.D.
Pawan Kumar Dhiman, Ph.D. (H.O.D)
Sanjeev Bansal, Ph.D

Associate Professors:

Sanjeev Kumar Garg, B.Tech., MBA

Assistant Professors:

Mandeep Ghai, MBA

DEPARTMENT OF FOOD ENGINEERING & TECHNOLOGY**Professors:**

Bahadur Singh Hathan, Ph.D.
C.S. Riar, Ph.D
D.C. Saxena, Ph.D. (H.O.D.)
H.K. Sharma, Ph.D.
Kamlesh Prasad, Ph.D.
M.B. Bera, Ph.D.
P.S. Panesar, Ph.D.
Pradyuman Kumar, Ph.D.
Sukhcharn Singh, Ph.D.
Vikas Nanda, Ph.D.

Associate Professors:

Charanjeev Singh Saini, Ph.D.

Assistant Professors:

Navdeep Jindal, M.Tech.

DEPARTMENT OF MATHEMATICS**Professor:**

Janak Raj Sharma, Ph.D.
Mandeep Singh, Ph.D.
R.K. Guha, Ph.D.
Ravi Kant Mishra, Ph.D.
S.S. Dhaliwal, Ph.D.
Sushma Gupta, Ph.D. (H.O.D.)
Vinod Mishra, Ph.D.
V.K. Kukreja, Ph.D.

Associate Professors:

Raj Kumar Goyal, M.Phil.

Assistant Professors:

Yogesh Kapil, M.Sc.

DEPARTMENT OF MECHANICAL ENGINEERING**Professors:**

Amandeep Singh Shahi, Ph.D.
Jagtar Singh, Ph.D.
Kulwant Singh, Ph.D.
Pardeep Gupta, Ph.D. (H.O.D.)
P.K. Singh, Ph.D.
Rajesh Kumar, Ph.D.
Ravindra Kumar Saxena, Ph.D.
Shankar Singh, Ph.D.
V. Sahni, Ph.D.

Associate Professors:

Amrik Singh, M.E.
Anil Kumar Singla, M.E.
Arvind Jayant, M.Tech.
Indraj Singh, M.Tech.
Jaspal Singh Gill, M.Tech.
Kanwalpreet Singh, M.E.
M.A. Akhtar, M.Tech.
Manoj Kumar Goyal, M.E.
Raj Kumar Yadav, Ph.D.
Rakesh Kumar, M.Tech.
Suresh Chandra Verma, M.E.

Assistant Professors:

Anuj Bansal, M.E.
Harish Kumar Arya, M.Tech.
Manpreet Singh, M.Tech. (on EOL)
Mohd. Majid, M.Tech.
Surinder Kumar, M.Tech.
Sunil Kumar, M.Tech.
Sumit Kumar, B.Tech.
Vivek Kumar, M.Tech.

DEPARTMENT OF CIVIL ENGINEERING

A.S.Shahi, Ph.D.(H.O.D.)

<p>DEPARTMENT OF PHYSICS</p> <p>Professors: A.S. Dhaliwal, Ph.D. Kiranjit Singh Kahlon, Ph.D. (H.O.D.) K.S. Mann, Ph.D. M.M. Sinha, Ph.D. S.S. Verma, Ph.D.</p> <p>Associate Professors : S.S.Ghumman, Ph.D.</p> <p>Assistant Professors: Kanika Aggrawal, M.Sc. M.Tech. Prabhdeep Kaur, Ph.D.</p> <p>TRAINING & PLACEMENT CELL Jap Preet Kaur Bhangu, Ph.D.(Head)</p> <p>WORKSHOP Shankar Singh, Ph.D. (Head)</p> <p>Asstt. Workshop Superintendent Harbhajan Singh, Diploma</p> <p>CENTRAL LIBRARY Librarians : Prithvi Singh Bamnia, M.Phil. Sanjay Gupta, M.Lib.Inf. Sci. (Admn. Incharge)</p> <p>SPORTS DEPARTMENT S.S.Punia, S.P.I., M.P.Ed., N.I.S.</p> <p>REGISTRAR Col. Arun Kainthla (Retd), M.A.LLB</p> <p>Deputy Registrar (Administration): Sanjeev Bansal, Ph.D.</p> <p>Deputy Registrar (Accounts): Rakesh Mishra, M.Com,LLB, DCA,PGDBA</p> <p>Deputy Registrar (Academics) Navdeep Jindal, M.Tech.</p>	<p>Faculty Incharge (Store & Purchase): V.K.Kukreja, Ph.D.</p> <p>Medical Officer: Charanjit Singh, M.B.B.S.</p> <p>Incharge Estate: Avinash Thakur, Ph.D. (Civil Wing) Charanjiv Gupta,M.Tech.(Elect. wing)</p> <p>Estate Officer: Sudeep Singh, M.Tech.</p>
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IMPORTANT INFORMATION

The Institute offers modular pattern of education in emerging areas of Engineering, Technology, Sciences, Humanities and Management. Following Programmes are offered by the institute:

(a) Integrated Certificate-Diploma (ICD) (b) 2-Year Diploma (c) B.E. (d) M.Tech.
(e) M.B.A. (f) M.Sc. (g) Ph.D.

2.1 **SLIET ENTRANCE TEST Schedule for admission in even semester of Ph.D.programme for the session 2015-2016**

The Entrance Test for admission for admission to Ph.D. programmes in even semester of the session 2015-16 shall be held on 02.01.2016(Saturday) at 14.30-16.30 Hours.

2.2 **Pattern of Examination**

There will be only one paper of two hours duration and of 100 marks.

Note : There will be objective type questions with four options having single correct answer. For each incorrect response, one fourth (1/4) of the total marks allotted to the question would be deducted. However, no deduction of marks will be made if no response is indicated for an item in the OMR Answer Sheet. The candidates appearing for Examination are advised not to attempt such item in the answer sheet if they are not sure of the correct response. **More than one answer indicated against a question will be deemed as incorrect response and will be negatively marked.** All objective type questions are required to be answered on OMR Answer Sheet to be provided at the time of Examination. Answers are to be marked using ball point pen (black / blue) only.

2.3 **Examination Centres: The centre for examination will be SLIET, Longowal only. programmes.**

2.4. **Application Fee**

Process of registration shall be offline only.

Online Application Fee

-	General & Other Categories (Boys)	:	₹1200/*-
-	General & Other Categories (Girls)	:	₹ 800/*-
-	SC / ST (Boys and Girls)	:	₹ 600/*-

*Bank Charges Extra

Mode of payment

In cash at SLIET counter or through DD drawn in favour of Director SLIET, payable at Longowal.

2.5. **Admit Cards**

Admit Card will be sent through email only provided by the candidate. No separate admit cards shall be sent by post.

2.6. **Merit List**

- All admissions will be made on merit determined for admission. In case of tie among two or more candidates, candidate elder in age as per the relevant entry in the matriculation certificate shall be placed higher in merit. Again, if there is tie in age (date of birth), candidate having higher marks in qualifying examination shall be placed higher in merit. Wrong filling of Date of Birth in Application Form will lead to disqualification of candidature.
- A candidate has to obtain a minimum marks in Entrance Test for inclusion in the merit list. Candidates who fail to appear in Entrance test (SET-V) will not be included in the merit list.
- **For admission to Ph.D. programmes (Part Time/Full Time)**
 - **MERIT List [In case of candidates appearing for the SLIET Entrance Test (SET-V)]:**
 - (a) Total marks secured in the SLIET Entrance test (SET-V) will be converted out of 70.
 - (b) The marks secured in the interview out of 30.
 - (c) Merit list will be prepared based on the total marks [(a)+(b)] secured by the candidate).
 - **MERIT List (in case of candidates exempted from appearing the Entrance Test) :**
 - (a) Total percentage of marks* secured in National Level Test (converted out of 70).
 - (b) The marks secured in the interview (converted out of 30).

- (c) Total marks will be out of 100.

*In case no marks / grade is mentioned on the Certificate of National Level Test and only qualifying criterion is there, such candidate will be awarded 50% marks against this component to calculate the overall merit. However candidate may improve this component for admission in Ph.D. programme at SLIET by appearing in written test of SET-V.

The lists of qualified candidates as per their information in admit card number and rank/merit will be displayed on the notice board of the Institute as per schedule. **Result will also be available on Institute Website : www.sliet.ac.in**

2.7 Medium of Examination:

The medium of entrance examination shall be English only.

2.8 PRINCIPLES OF RESERVATION APPLICABLE TO ALL ADMISSIONS

Being Centrally Funded Technical Institute, candidates would be considered for reservation and other benefits under SC/ST/OBC quota as per the guidelines issued/list published by Government of India for the purpose.

2.9 WITHDRAWAL FROM ADMISSION and REFUND OF FEE

A candidate after taking admission in the Institute may withdraw his/her admission and request for refund of fee as per following procedure:

Withdrawal: The candidate has to make a written request to the Chairman, SET-2016 in the prescribed Performa available in SET office for withdrawal of his / her admission and get the same approved.

Refund of Fee: After approval of withdrawal of admission from Chairman, SET-2016, the candidate is required to obtain blank Performa of "No Dues Certificate" from the Academic Section of the Institute. After getting "No Due Certificate" completed from all the Departments / Sections concerned of the Institute, this is to be submitted in **Original** in Accounts Section and a copy be submitted with academic section. **The case of refund of fee will be processed only after submission of complete "No Dues Certificate". The refund will be made as per Institute norms.**

Note: If the admission is withdrawn before the start of academic session / classes, then there is no need to submit "No Dues Certificate" for refund of fee.

2.10 LEGAL JURISDICTION

All disputes pertaining to the counselling and admission to Ph.D. programme of SLIET, Longowal shall fall within the jurisdiction of Sangrur (Punjab) only.

2.11 DISCLAIMER

The statement made in the information brochure and all other information contained herein is believed to be correct at the time of publication. However, the Institute reserves the right to make changes at any time without notice, in and additions to the regulations, conditions governing the admission, requirements, seats, fees and any other information, or statements contained in this information brochure. No responsibility will be accepted by the Institute for hardship or expenses encountered by candidates / any other person for such changes, additions, omissions or errors, no matter how those are caused.

Ph.D. PROGRAMME (SET-V)

3. Ph.D. Programmes

Creative and productive enquiry is the basic concept underlying the research work. The award of the Ph.D. Degree is in respect of high achievements, independent research and application of scientific knowledge to the solution of scientific and technical problems. The admission to Ph.D. programme (Part Time/Full Time) will be strictly as per institute rules.

(a) Eligibility:

Master's Degree in Engineering / Technology / Science / Humanities / Management with 60% marks (55% for reserved categories) in relevant disciplines.

(b) Departments : Admission to Ph.D. programmes is available in following categories :

- (i) Full Time (with fellowship)*
- (ii) Full Time (without fellowship)

(iii) Part Time

*The student in the Full Time(with fellowship) shall be governed by rules and regulation of MHRD, New Delhi (Reference no. SR/S9/Z-09/2012 dated 21.10.2014 and F.No. 17-2/2014-TS.1 dated 02.03.2015.)

Some of the students from engineering/science departments may be considered for Research Assistance ship under TEQIP-II subject to availability of scheme and fund.

Reservations will be as per Government of India norms.

Sr. No.	Department
1	Chemical Engineering (Ph.D. -CE)
2	Chemistry (Ph.D.-CHY)
3	Computer Science and Engineering (Ph.D.-CS)
4	Electrical & Instrumentation Engineering (Ph.D.-EIE)
5	Electronics & Communication Engineering (Ph.D.-ECE)
6	Humanities (English) (Ph.D.-ENG)
7	Food Engineering & Technology (Ph.D.-FET)
8	Management (Ph.D.-MGT)
9	Mathematics (Ph.D.-MATH)
10	Mechanical Engineering (Ph.D.-ME)
11	Physics (Ph.D.-PHY)

The seats may be increased or decreased as per recommendations of the respective departments at the time of the interview as per suitability of the candidates. However, Director, SLIET reserves the rights not to fill the seats if suitable candidates are not found.

(c) Admission Procedure:

- (I) The candidates can apply online by 15.12.2015 who fulfill the conditions of eligibility criteria for fellowship as per the norms of MHRD, Govt. of India in respect to the score card of GATE/NET/CSIR etc.
- (II) Candidates fulfilling the eligibility criteria can also apply for Ph.D. Programmes (Full Time without fellowship).
- (III) The eligible candidates who have qualified UGC / CSIR(JRF) NET with OR without fellowship / NET(ASRB)/ State level eligibility test(SLET/SET)/ GATE are exempted from appearing for the entrance examination, However they should submit the proof of qualifying the examination. The candidates have to appear for the interview.
- (IV) **MERIT List (in case of candidates appearing for the All India SLIET Entrance Test [SET-V]):**
 - (a) Total marks secured in the SLIET Entrance test (SET-V) will be converted out of 70.
 - (b) The marks secured in the interview out of 30.
 - (c) Merit list will be prepared based on the total marks [(a)+(b)] secured by the candidate.

(v) MERIT List (in case of candidates exempted from appearing in the Entrance Test) :

The merit list will be prepared on the basis of:

- (a) Total percentage of marks* secured in National Level Test (converted out of 70).
- (b) The marks secured in the interview (converted out of 30).
- (c) Total marks will be out of 100.

*In case no marks / grade is mentioned on the Certificate of National Level Test and only qualifying criterion is there, such candidate will be awarded 50% marks in the test component. However, if he/she wish to improve the marks in the test component he/she can appear in the written test (SET-V) conducted by the institute.

- (VI) The interview will be applicable to all the candidates. Admission will be given on the basis of the combined merit list prepared on the basis of above (IV), (V) and recommendations of interviewing selection panel in each department.
- (VII) Decision of interview selection panel will be final in respect of suitability of candidate and his / her qualifications for given department.

(VIII) All the Ph.D. candidates will have to complete their course work and get their provisional enrolment confirmed as per Ordinances, Rules & Regulations of Ph.D. Program of SLIET, Longowal as enforced from time to time. The course Research Methodology is compulsory for all selected Ph.D. candidates as per the notification by the UGC (The Gazette of India, July 11, 2009).

(IX) The ordinances, rules & regulations for Ph.D. programmes of SLIET, Longowal shall be applicable to all the successful candidates as in force time to time.

(d) **Seats:** The number of seats shall be displayed on institute website separately.

(e) **Entrance Test Schedule :**

Test	Date	Time
SET-V (Ph.D.)	02 Jan, 2016	14.30 – 16.30 Hours

(f) **FEE STRUCTURE FOR Ph.D. PROGRAMME FOR ACADEMIC YEAR 2015-16**

Ph.D (Part Time/Full Time)		
A. REFUNDABLE FEES: (WITHOUT ANY INTEREST) To be paid at the time of admission	Caution Money Institute/Hostel	5000
	Total (A)	5000
B. NON REFUNDABLE FEES (To be paid at the time of admission)	Admission Related Fund, Students Activity Related Fund & Library Related Fund	5000
	Total (B)	5000
C. OTHER FEE PER SEMESTER (Non-Refundable)	Tuition Fee	5000
	Other Charges	1000
	Hostel Fee	2500
	Total (C)	8500
Grand Total (A+B+C) (in ₹)		18500

- Student availing mess facility will have to pay Rs 10,000 as caution money (interest free) extra at the time of admission.
- The examination fee towards thesis submission for Ph.D. students is Rs.5000/- (to be paid at time of submission of thesis).
- The fee structure may be revised from time to time with the approval of competent authority.

Note: Any exemption, in any type of fee shall be as per Rules & Regulations for Ph.D. of SLIET Longowal.

SYLLABUS OF SLIET ENTRANCE TEST (SET-V) For admission to Ph.D. Programme-2015

Pattern of SET-V

SLIET Entrance Test (SET-V) for admission to Ph.D. Programme will consist of one paper of two hours duration. This paper will have 100 objective type questions of 100 marks.

Note : *Answers of the objective type questions are to be filled in the OMR answer sheet given separately during the Examination. There will be 25% negative marking for wrong answers.*

SYLLABUS

**Marks: 100 (100 questions)
02 Hours**

Time :

Ph.D. (Chemical Engineering)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Process Calculations and Thermodynamics:

Laws of conservation of mass and energy; use of tie components; recycle, bypass and purge calculations; Degree of freedom analysis. First and Second laws of thermodynamics. First law application to close and open systems. Second law and Entropy, Thermodynamic properties of pure substances: equation of state and departure function, properties of mixtures: partial molar properties, fugacity, excess properties and activity coefficients; phase equilibria: predicting VLE of systems; chemical reaction equilibria.

Fluid Mechanics and Mechanical Operations:

Fluid statics, Newtonian and non-Newtonian fluids, Bernoulli equation, Macroscopic friction factors, energy balance, dimensional analysis, shell balances, flow through pipeline systems, flow meters, pumps and compressors, packed and fluidized beds, elementary boundary layer theory, size reduction and size separation; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, mixing and agitation; conveying of solids.

Heat Transfer:

Conduction, convection and radiation, heat transfer coefficients, steady and unsteady heat conduction, boiling, condensation and evaporation; types of heat exchangers, evaporators and their design.

Mass Transfer:

Fick's law, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies; stagewise and continuous contacting and stage efficiencies; HTU & NTU concepts design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, drying, humidification, dehumidification and adsorption.

Chemical Reaction Engineering:

Theories of reaction rates; kinetics of homogeneous reactions, interpretation of kinetic data, single and multiple reactions in ideal reactors, non-ideal reactors; residence time distribution, single parameter model; non-isothermal reactors; kinetics of heterogeneous catalytic reactions; diffusion effects in catalysis.

Instrumentation and Process Control:

Measurement of process variables; sensors, transducers and their dynamics, transfer functions and dynamic responses of simple systems, process reaction curve, controller modes (P, PI, and PID); control valves; analysis of closed loop systems including stability, frequency response and controller tuning, cascade, feed forward control.

Plant Design and Economics:

Process design and sizing of chemical engineering equipment such as compressors, heat exchangers, multistage contactors; principles of process economics and cost estimation including total annualized cost, cost indexes, rate of return, payback period, discounted cash flow, optimization in design.

Chemical Technology:

Inorganic chemical industries; sulfuric acid, NaOH, fertilizers (Ammonia, Urea, SSP and TSP); natural products industries (Pulp and Paper, Sugar, Oil, and Fats); petroleum refining and petrochemicals; polymerization industries; polyethylene, polypropylene, PVC and polyester synthetic fibers.

Ph.D. (Chemistry)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Inorganic Chemistry

1. Chemical periodicity
2. Structure and bonding in homo-and heteronuclear molecules, including shapes of molecules (VSEPR Theory).
3. Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.
4. Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.
5. Transition elements and coordination compounds: structure, bonding theories, spectral and magnetic properties, reaction mechanisms.
6. Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.
7. Organometallic compounds: synthesis, bonding and structure, and reactivity. Organometallics in homogeneous catalysis.
8. Cages and metal clusters.
9. Analytical chemistry-separation, spectroscopic, electro-and thermoanalytical methods.
10. Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron-transfer reactions; nitrogen fixation, metal complexes in medicine.
11. Characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-vis, NQR, MS, electron spectroscopy and microscopic techniques.
12. Nuclear chemistry: nuclear reactions, fission and fusion, radio analytical techniques and activation analysis.

Physical Chemistry

1. Basic principles of quantum mechanics: Postulates; operator algebra; exactly-solvable systems: particle-in-a-box, harmonic oscillator and the hydrogen atom, including shapes of atomic orbitals; orbital and spin angular momenta; tunneling.
2. Approximate methods of quantum mechanics: Variational principle; perturbation theory up to second order in energy; applications.
3. Atomic structure and spectroscopy; term symbols; many-electron systems and antisymmetry principle.
4. Chemical bonding in diatomics; elementary concepts of MO and VB theories; Huckel theory for conjugated π -electron systems.
5. Chemical applications of group theory; symmetry elements; point groups; character tables; selection rules.
6. Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities—selection rules; basic principles of magnetic resonance.
7. Chemical thermodynamics: Laws, state and path functions and their applications; thermodynamic description of various types of processes; Maxwell's relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le Chatelier principle; elementary description of phase transitions; phase equilibria and phase rule; thermodynamics of ideal and non-ideal gases, and solutions.
8. Statistical thermodynamics: Boltzmann distribution; kinetic theory of gases; partition functions and their relation to thermodynamic quantities –calculations for model systems.
9. Electrochemistry: Nernst equation, redox systems, electrochemical cells; Debye-Huckel theory; electrolytic conductance –Kohlrausch's law and its applications; ionic equilibria; conductometric and potentiometric titrations.
10. Chemical kinetics: Empirical rate laws and temperature dependence; complex reactions; steady state approximation; determination of reaction mechanisms; collision and transition state theories of rate

constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.

11. Colloids and surfaces: Stability and properties of colloids; isotherms and surface area; heterogeneous catalysis.

12. Solid state: Crystal structures; Bragg's law and applications; band structure of solids.

13. Polymer chemistry: Molar masses; kinetics of polymerization.

14. Data analysis: Mean and standard deviation; absolute and relative errors; linear regression; covariance and correlation coefficient.

Organic Chemistry

1. IUPAC nomenclature of organic molecules including regio- and stereoisomers.

2. Principles of stereochemistry: Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.

3. Aromaticity: Benzenoid and non-benzenoid compounds—generation and reactions.

4. Organic reactive intermediates: Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzyne and nitrenes.

5. Organic reaction mechanisms involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.

6. Common named reactions and rearrangements—applications in organic synthesis.

7. Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic). Chemo, regio and stereoselective transformations.

8. Concepts in organic synthesis: Retrosynthesis, disconnection, synthons, linear and convergent synthesis, umpolung of reactivity and protecting groups.

9. Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction—substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio-discrimination. Resolution—optical and kinetic.

10. Pericyclic reactions—electrocyclisation, cycloaddition, sigmatropic rearrangements and other related concerted reactions. Principles and applications of photochemical reactions in organic chemistry.

11. Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S).

12. Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.

13. Structure determination of organic compounds by IR, UV-Vis, ¹H & ¹³C NMR and Mass spectroscopic techniques. Interdisciplinary topics.

Interdisciplinary topics

1. Chemistry in nanoscience and technology

2. Catalysis and green chemistry

3. Medicinal chemistry.

4. Supramolecular chemistry.

5. Environmental chemistry

Ph.D. (Computer Science & Engineering)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Programming Concepts: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

Theory of Computation: Regular languages and finite automata, Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, NP completeness. Distributed Computing, Introduction to Grid and Cloud Computing, Issues of Grid and Cloud Computing.

Digital Logic: Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point).

Computer Organization and Architecture: Machine instructions and addressing modes, ALU and datapath, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.

Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching.

Operating System: Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.

Databases: ER-model, Relational models, Database design (integrity constraints, normal forms), Query languages (SQL), Transactions and concurrency control. Data Warehouse environment, Architecture of a data warehouse methodology" analysis, design, construction and administration, Extracting models and patterns from large databases, data mining techniques, regression, clustering, summarization, dependency modeling, link analysis, sequencing analysis, mining scientific and business data.

Computer Networks: LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, Basic concepts of hubs, switches, gateways, and routers. Mobile Ad-hoc Networks, Technologies for Ad-hoc Network, Issues in Ad-hoc wireless Networks, IEEE 802.11 Basic Sensor Network Architectural Elements, Applications of Sensor Networks, Comparison with Wireless Networks, Challenges and Hurdles. Architecture of Wireless Sensor Networks (WSNs), Hardware components

Image Processing: Digital Image Fundamentals, image formation, geometric and photometric models, digitization including sampling, quantization and digital image visual details.

Ph.D. (Electrical and Instrumentation Engineering)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Electrical Technology and Networks: Introduction to electrical systems, DC and AC circuits, basic electrical components, electromagnetism, alternating quantities, AC power, single phase series and parallel circuits, resonance, Comparison between Magnetic and Electric circuits, Electromagnetic Induction, Magnetic Effects of Electric Current, Current carrying conductor in Magnetic field, Law of Electromagnetic Induction, Self-Inductance, Mutual Inductance, Coupling Coefficient between two magnetically coupled Circuits, Transformer: principle, construction, working, efficiency, application. D.C. Generator: principle, construction, working, application, D.C. Motor: principle, construction, working, application. Three phase Induction Motor: principle, construction, working, application. Nodal and mesh analysis, network theorems, superposition. Thevenin, Norton, reciprocity, Millman's, Tellegen's theorems, star-delta transformation, steady state sinusoidal analysis using phasors, Fourier series, linear constant coefficient differential and difference equations; time domain analysis and frequency domain analysis of RLC series and parallel circuits, convolution, 2-port network parameters, driving point and transfer functions, state equation for networks, attenuators (lattice, T-type, P-type, L-type, ladder type, balanced), conventional filters, passive network synthesis (positive real functions, LC network, synthesis of dissipative network, two terminal R-L and R-C network).

Electronics Principles: Characteristics and equivalent circuits (large and small signal) of diodes (pn junction, zener, schottky, varactor), BJT, JFETs, UJT, and MOSFET; clipping, clamping, rectifier; biasing and bias stability of transistor and FET amplifiers, single and multistage coupling, differential, operational, feedback and power. Analysis of amplifiers, frequency response of amplifiers. op-amp circuits, filters, sinusoidal oscillators, criterion of oscillation, function generators and wave-shaping circuits, power supplies, display units.

Power Electronics- Introduction to thyristor family V-I characteristics of SCR, SUS, PUT, SCS, GTO, LASCR. Principle of operation of SCR. Two transistor analogy. Turn on methods of a thyristor Switching characteristics of thyristors during turn-on and turn-off. Gate characteristics. Firing of thyristors. Gate triggering circuits. Series and parallel, operation of SCRs and their triggering circuits. Thyristor specifications; such as latching current and holding current, dv/dt and di/dt , PTV etc. Protection of SCR from over voltage and over current. Snubber circuits. Power dissipation. Introduction to phase angle control. Single phase half wave controlled rectifiers. Single phase half controlled and fully controlled bridge rectifiers. Three phase fully controlled bridge rectifiers. Effect of resistive, inductive and resistive cum inductive loads. Basic circuit and principle of operation of Dual Converter, circulating current mode and

non-circulating current mode of operation. Introduction to inverter. Operating principle and already state analysis of single phase, voltage source, bridge inverter. Modified McMurray half-bridge and full bridge inverter. Three phase bridge inverter. Voltage control (PWM control etc.) and reduction of harmonics in the inverter output voltage.

Digital electronics and microprocessors : Number systems and arithmetic (binary, Gray , BCD , Excess-3). Boolean algebra, minimization of Boolean functions, logic gates, IC families, combinational and sequential circuits, sample and hold circuits, ADCs and DACs, semiconductor memories, ALU design, microprocessor (8085), architecture, programming, memory and I/O interfacing chips (8255, 8253, 8251, 8279, 8259), introduction to microprocessor 8086 and microcontroller 8051.

Transducers and Instrumentation: Measurement of voltage, current, power, energy and power factor for Bridges and potentiometers, PMMC moving iron, dynamometer and induction type instruments, instrument transformer, digital voltmeters and multi-meters, phase, time and frequency measurement, Q-meter, oscilloscope, potentiometric recorders, error analysis, transducers-elastic, resistive, inductive, capacitive, thermo-electric, piezo-electric, photo-electric, electro-mechanical, electro-chemical and ultrasonic measurement of displacement, velocity, acceleration, shock, vibration, force, torque, power, strain, stress, pressure, flow, temperature, humidity, viscosity and density.

Control Theory :Basic control system components, block diagram description, signal flow graphs, reduction of block diagrams, input test signals, properties of systems, linearity, time-invariance, stability, open loop and closed loop (feedback) systems, properties of linear time-invariant (LTI) systems, transient and steady state analysis of LTI system and frequency response. LTI control system analysis, root loci, Routh Hurwitz criterion, polar plots, Bode and Nyquist plots, elements of lead and lag compensations, state space representation of systems, state equations, decomposition, direct, cascade and parallel, solution of state equations, Laplace method, Calay-Hamilton method, diagonalization method and Sylvester method. Digital control, Configuration of the basic Digital control scheme, Principles of signal conversion, Basic Discrete-Time signals, Time-Domain Models for Discrete – Time Systems, Transfer function Model, Stability in the Z-Plane & Jury stability criterion, Sampling as impulse modulation, Sampled spectra & Aliasing, Filtering, Practical aspects of the choice of sampling rate, Principles of Discretization,

Programming concepts: Algorithms, programming in C and C++, data types, console/file input and output, arrays, structures, pointers, functions, command line arguments, passing of parameters from one function to other, concept of OOPs.

Power Systems: Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference; distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow; voltage control; power factor correction; economic operation; symmetrical components; fault analysis; principles of over-current, differential and distance protection; solid state relays and digital protection; circuit breakers; system stability concepts, swing curves and equal area criterion, HVDC transmission and FACTS concepts.

Ph.D. (Electronics & Communication Engineering)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Electronic Devices and Circuits: Semiconductor physics, diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. p-n junction diode, Zener diode, tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-i-n and avalanche photo diode, Basics of LASERs. Device technology: integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography. Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and analog CMOS. Simple diode circuits, clipping, clamping, rectifier. Biasing and bias stability of transistor and FET amplifiers. Amplifiers: single and multi-stage, differential and operational, feedback, and power. Frequency response of amplifiers. Simple op-amp circuits. Filters. Sinusoidal oscillators; criterion for oscillation; single-transistor and op-amp configurations. Function generators and wave-shaping circuits, 555 Timers. Power supplies.

Digital Systems: Boolean algebra, minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift-registers. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor(8085): architecture, programming, memory and I/O interfacing.

Signal Processing: Laplace transform, continuous-time and discrete-time Fourier series, continuous-time and discrete-time Fourier Transform, DFT and FFT, z-transform. Sampling theorem. Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems.

Control Theory: Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems; transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators: elements of lead and lag compensation, elements of Proportional-Integral-Derivative (PID) control. State variable representation and solution of state equation of LTI control systems.

Communication Systems: Random signals and noise: probability, random variables, probability density function, Auto-correlation, power spectral density. Analog communication systems: amplitude and angle modulation and demodulation systems, spectral analysis of these operations, superheterodyne receivers; elements of hardware, realizations of analog communication systems; signal-to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions. Fundamentals of information theory and channel capacity theorem. Digital communication systems: pulse code modulation (PCM), differential pulse code modulation (DPCM), digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), matched filter receivers, bandwidth consideration and probability of error calculations for these schemes. Basics of TDMA, FDMA and CDMA, wireless and cellular communication, GSM, wireless networks and sensors.

Electromagnetics & Microwaves: Elements of vector calculus: divergence and curl; Gauss' and Stokes' theorems, Maxwell's equations: differential and integral forms. Wave equation, Poynting vector. Plane waves: propagation through various media; reflection and refraction; phase and group velocity; skin depth. Transmission lines: characteristic impedance; impedance transformation; Smith chart; impedance matching; S parameters, pulse excitation. Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Strip line structures, Basics of Antennas: Dipole antennas, antenna parameters, microwave components and circuits.

Ph.D. (English)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Literary Critical Theory: Main features and major exponents/works: New Criticism, Stylistics, Structuralism, Deconstruction, Discourse Analysis, Feminism, Post Colonialism, Postmodernism

Study of Language :Study of Language, Speech Mechanism, Vowels, Consonants, ELT

Indian English Literature: Nissim Ezekiel, Kamala Das, A.K. Ramanujan, Mulk Raj Anand, Raja Rao, R.K. Narayan, Bhabani Bhattacharya, Manohar Magonkar, Anita Desai, Arun Joshi, Nayantara Sehgal, Shashi Deshpande, Shobha De, Amitav Ghosh, Kiran Desai, Githa, Hariharan, Girish Karnad, Mahesh Dattani, Vijay Tendulkar, Nirad C. Chaudhary, Khushwant Singh

Drama: British Drama, Greek Drama, Shakespearean Drama, Jacobean Drama, Restoration Drama, Theatre of the Absurd, American Drama, African American Theatre

Poetry: Chaucer, Metaphysical Poetry, Neo Classical Poetry, Romantic Poetry, Victorian Poetry, Post Modernist Poetry, American Poetry

Fiction: Women Novelists, Victorian Novelists, Early 20th Century Novelists, English Novelists of Post 1950's, American Novelists

Diasporic Literature: V.S. Naipaul, Salman Rushdie, Bharati Mukherjee, Vikram Seth, Rohinton Mistry

Post Colonial Literature: Chinua Achebe, Wole Soyinka, Nadine Gordimer, Michael Ondaatje, Margaret Atwood

Ph.D. (Food Engineering & Technology)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Food Analysis: Texture analysis of foods, Microscopic techniques in food analysis (light microscopy, SEM, TEM, XRD, particle size analysis, image analysis etc.), Thermal methods in food analysis (Differential scanning calorimetry and others), Chromatographic methods in food analysis and separation, Enzymatic methods of food analysis, application of biosensors in food analysis.

Food Quality and Management: Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation; Total Quality Management; GMP/GHP; GLP, GAP; Sanitary and hygienic practices; HACCP; Indian & International quality systems and standards like Food Safety and Standards Act, 2006, ISO and Food Codex.

Food Engineering: Engineering properties of foods, steady state and unsteady state heat transfer, Mass transfer, Death rate kinetics, thermal process calculations, heat and mass balance in single effect and multiple effect evaporator, methods to improve steam economy, Drying Rates, theories of drying, Freezing curves, freezing time calculations, membrane separation techniques, centrifugation and fluidization, viscometry and food rheology.

Food Process Technology: Mechanism and application of High Pressure processing, Ultrasonic processing, Microwave and radio frequency processing high intensity light, pulse electric field, ohmic heating, IR heating, inductive heating and hurdle technology in food processing and preservation.

Food Process Equipment Design: Basic Scientific and Engineering principles of equipment design, Riveted and welded joints, corrosion mechanism and corrosion control, Design of vessels and storage tanks.

Bioprocess Engineering: Fundamentals of growth kinetics, Media sterilization, Air Sterilization, Bioreactor fermenter, Aeration and Agitation. Bioprocess instrumentation, Bioprocess modeling and simulation and its application in industrial fermentation, scale-up of fermentation processes.

Ph.D. (Management)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Unit-1: Managerial Economics-Demand Analysis, Production Function, Cost-Output relation, Market Structures, Pricing Theories, Capital Budgeting

The concept and significance of organizational behavior, Personality-Perception-Values-Attitude-Learning & Motivation

Communication-Leadership-Managing Change, Organizational Development, Concepts & perspectives on HRM HRP- Objectives, Process & Techniques, Job Analysis-Selection-Induction-Training & Development, Performance Appraisal & Evaluation, Industrial Relations & Trade Unions, Dispute resolution and Grievance management

Unit-2: Financial Management-Nature & Scope, Capital Budgeting Decisions, Capital Structure & Cost of capital Dividend policy-Determinants, Mergers & Acquisitions, Marketing Information System & marketing research, Demand measurement & Forecasting, Market Segmentation-Targeting & positioning, Product life cycle, Pricing methods & strategies, Marketing Management, Marketing Mix, Customer Relation shift Management, Role & Scope of Production management, Facility Locations- Layout Managing & Analysis, Production Scheduling, Statistical Quality Control

Unit-3: Probability Theory, Probability, Distribution-Binomial, Poisson, Normal, Correlation & Regression Analysis, Sampling Theory & Sampling Distribution, Tests of Hypothesis-t, Z,F, chi-square tests, Concepts

of corporate strategy-Ansoff's growth vector, BCG Model, Porter's generic strategies, Competitive strategy & Corporate Strategy, Competitive advantage of nations, RTP & WTO, Innovation & Entrepreneurship, Concept of Govt. Policy for promotion of small & Tiny Enterprises, Detailed Business Plan Preparation – Managing small industries –sickness in small enterprises

Unit-4: Ethics & Management System, Value based organizations, Ethical pressure on individual in organization Environmental ethics, Social responsibilities of Business, Corporate Governance, Research-Meaning, types, objectives, process survey based research-types of survey-specific-periodic & transaction drivers, Identification of research problem analysis of research problem, Categorization & sampling, Planning a survey Project-resources budget-schedule, Preparation of Questionnaire,-Data Collection analysis & compilation of Survey report.

Ph.D (Mathematics)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Linear Algebra: Finite dimensional vector spaces; Linear transformations and their matrix representations, rank; systems of linear equations, eigen values and eigen vectors, minimal polynomial, Cayley-Hamilton theorem, diagonalisation, Hermitian, Skew-Hermitian and unitary matrices; Finite dimensional inner product spaces, Gram-Schmidt orthonormalization process, self-adjoint operators.

Complex Analysis: Analytic functions, conformal mappings, bilinear transformations; complex integration:Cauchy's integral theorem and formula; Liouville's theorem, maximum modulus principle; Taylor and Laurent's series; residue theorem and applications for evaluating real integrals.

Real Analysis: Sequences and series of functions, uniform convergence, power series, Fourier series, functions of several variables, maxima, minima; Riemann integration, multiple integrals, line, surface and volume integrals, theorems of Green, Stokes and Gauss; metric spaces, completeness, Weierstrass approximation theorem, compactness; Lebesgue measure, measurable functions; Lebesgue integral, Fatou's lemma, dominated convergence theorem.

Ordinary Differential Equations: First order ordinary differential equations, existence and uniqueness theorems, systems of linear first order ordinary differential equations, linear ordinary differential equations of higher order with constant coefficients; linear second order ordinary differential equations with variable coefficients.

Algebra: Fundamental theorem of arithmetic, divisibility in \mathbb{Z} , congruence, Chinese Remainder Theorem, Euler's ϕ function, primitive roots. Normal subgroups and homomorphism theorems, automorphisms; Group actions, Sylow's theorems and their applications; Euclidean domains, Principal ideal domains and unique factorization domains. Prime ideals and maximal ideals in commutative rings; Fields, finite fields.

Functional Analysis: Banach spaces, Hahn-Banach extension theorem, open mapping and closed graph theorems, principle of uniform boundedness; Hilbert spaces, orthonormal bases, Riesz representation theorem, bounded linear operators.

Numerical Analysis: Numerical solution of algebraic and transcendental equations: bisection, secant method, Newton-Raphson method, fixed point iteration; interpolation: error of polynomial interpolation, Lagrange, Newton interpolations; numerical differentiation; numerical integration: Trapezoidal and Simpson rules, Gauss Legendre quadrature, method of undetermined parameters; least square polynomial approximation; numerical solution of systems of linear equations: direct methods (Gauss elimination, LU decomposition); iterative methods (Jacobi and Gauss-Seidel); matrix eigenvalue problems: power method, numerical solution of ordinary differential equations: initial value problems: Taylor series methods, Euler's method, Runge-Kutta methods.

Partial Differential Equations: Linear and quasilinear first order partial differential equations, method of characteristics; second order linear equations in two variables and their classification; Cauchy, Dirichlet and Neumann problems; solutions of Laplace, wave and diffusion equations in two variables; Fourier series and Fourier transform and Laplace transform methods of solutions for the above equations.

Mechanics: Generalized coordinates, Lagrange's equations, Hamilton's canonical equations, Hamilton's Principle and principle of least action, Two dimensional motion of rigid bodies, Euler's dynamical equations for the motion of rigid body about an axis, theory of small oscillations.

Topology: Basic concepts of topology, product topology, connectedness, countability and separation

axioms, Urysohn's Lemma. Compactness.

Probability and Statistics: Probability space, conditional probability, Bayes theorem, independence, Random variables, joint and conditional distributions, standard probability distributions and their properties, expectation, conditional expectation, moments, Sampling distributions, Testing of hypotheses, standard parametric test based on normal χ^2 , t, F-distributions.

Linear programming: Linear programming problem and its formulation, convex sets and their properties, graphical method, basic feasible solution, simplex method, big-M and two phase methods; infeasible and unbounded LPP's, alternate optima; Dual problem and duality theorems, Balanced and unbalanced transportation problems, u -u method for solving transportation problems; Hungarian method for solving assignment problems.

Ph.D. (Mechanical Engineering)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper Part- A (40 % of Content)

Engineering Materials: Structure and properties of engineering materials and their applications; effect of strain, strain rate and temperature on mechanical properties of metals and alloys; heat treatment of metals and alloys, its influence on mechanical properties.

Engineering Mechanics: Free body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion, including impulse and momentum (linear and angular) and energy formulations; impact.

Strength of Materials: Stress and strain, stress-strain relationship and elastic constants, Mohr's circle for plane stress and plane strain, thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; strain energy methods; thermal stresses.

Theory of Machines and Design: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of slider-crank mechanism; gear trains; flywheels.

Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; *principles* of the design of machine elements such as bolted, riveted and welded joints, shafts, spur gears, rolling and sliding contact bearings, brakes and clutches.

Vibrations: Free and forced vibration of single Degree of freedom systems; effect of damping; vibration isolation; resonance, critical speeds of shafts.

Thermal Engineering: Fluid mechanics - fluid statics, Bernoulli's equation, flow through pipes, equations of continuity and momentum; thermodynamics - zeroth, first and second law of thermodynamics, thermodynamic system and processes, calculation of work and heat for systems and control volumes; air standard cycles; basics of internal combustion engines and steam turbines; heat transfer - fundamentals of conduction, convection and radiation, heat exchangers.

Subject Paper Part- B (40 % of Content)

Metal Casting: Casting processes - types and applications; patterns - types and materials; allowances; moulds and cores - materials, making, and testing; casting techniques of cast iron, steels and nonferrous metals and alloys; solidification; design of casting, gating and risering; casting inspection, defects and remedies.

Metal Forming: Stress-strain relations in elastic and plastic deformation; concept of flow stress, deformation mechanisms; hot and cold working - forging, rolling, extrusion, wire and tube drawing; sheet metal working Processes, analysis of rolling, forging, extrusion and wire /rod drawing; metal working defects.

Advanced Welding Processes: Welding processes - manual metal arc, MIG, TIG, plasma arc, submerged arc, electro slag, thermit, resistance, forge, friction, and explosive welding, inspection of welded joints, defects and remedies; - ultrasonic, electron beam, laser beam; thermal cutting.

Machining and Machine Tool Operations: Basic machine tools; machining processes, mechanics of machining, Merchant's analysis; selection of machining parameters; tool materials, tool wear and tool life, thermal aspects of machining, cutting fluids, machinability; principles and applications of nontraditional machining processes - USM, AJM, WJM, EDM and Wire cut EDM, LBM, EBM, PAM, CHM, ECM.

Metrology and Inspection: Limits, fits, and tolerances, interchangeability, selective assembly; linear and angular measurements by mechanical and optical methods, comparators; design of limit gauges; interferometry; measurement of straightness, flatness, roundness, squareness and symmetry; surface finish measurement; inspection of screw threads and gears; alignment testing of machine tools.

Computer Integrated Manufacturing: Basic concepts of CAD, CAM, CAPP, cellular manufacturing, NC, CNC, DNC, Robotics, FMS, and CIM. Principles of good product design, tolerance design; quality and cost considerations; product life cycle; concurrent engineering.

Facility Design: Facility location factors and evaluation of alternate locations; types of plant layout and their evaluation; computer aided layout design techniques; assembly line balancing; materials handling systems.

Production Planning and Inventory Control: Forecasting techniques, aggregate production planning; MRP and MRP-II; order control and flow control; routing, scheduling and priority dispatching; push and pull production systems, concept of JIT manufacturing system; logistics, distribution, and supply chain management; inventory models,

Operations Research: Linear programming, simplex method, duality and sensitivity analysis; transportation and assignment models; network flow models, constrained optimization and Lagrange multipliers; simple queuing models; dynamic programming; simulation - manufacturing applications; PERT and CPM,

Quality Management: Quality - concept and costs, quality circles, quality assurance; statistical quality control, acceptance sampling, zero defects, six sigma; total quality management; ISO 9000; design of experiments - Taguchi method.

Reliability and Maintenance: Reliability, availability and maintainability; distribution of failure and repair times; determination of MTBF and MTTR, reliability models; system reliability determination; preventive maintenance and replacement, total productive maintenance - concept and applications.

Ph.D. (Physics)

Marks: 100 (100 questions)

General Aptitude(20%)

- Numerical Ability
- Numerical Analysis
- Statistics
- Communication Ability

Subject Paper(80%)

Mathematical Methods of Physics :

Dimensional analysis; Vector algebra and vector calculus; Linear algebra, matrices, Cayley Hamilton theorem, eigenvalue problems; Linear differential equations; Special functions (Hermite, Bessel, Laguerre and Legendre); Fourier

series, Fourier and Laplace transforms; Elements of complex analysis: Laurent series-poles, residues and evaluation of integrals; Elementary ideas about tensors; Introductory group theory, SU(2), O(3); Elements of computational techniques: roots of functions, interpolation, extrapolation, integration by trapezoid and Simpson's rule, solution of first order differential equations using Runge-Kutta method; Finite difference methods; Elementary probability theory, random variables, binomial, Poisson and normal distributions.

Classical Mechanics

Newton's laws; Phase space dynamics, stability analysis; Central-force motion; Two-body collisions, scattering in laboratory and centre-of-mass frames; Rigid body dynamics, moment of inertia tensor, non-inertial frames and pseudoforces; Variational principle, Lagrangian and Hamiltonian formalisms and equations of motion; Poisson brackets and canonical transformations; Symmetry, invariance and conservation laws, cyclic coordinates; Periodic motion, small oscillations and normal modes; Special theory of relativity, Lorentz transformations, relativistic kinematics and mass-energy equivalence.

Electromagnetic Theory

Electrostatics: Gauss' Law and its applications; Laplace and Poisson equations, boundary value problems; Magnetostatics: Biot-Savart law, Ampere's theorem, electromagnetic induction; Maxwell's equations in free space and linear isotropic media; boundary conditions on fields at interfaces; Scalar and vector potentials; Gauge invariance; Electromagnetic waves in free space, dielectrics, and conductors; Reflection and refraction, polarization, Fresnel's Law, interference, coherence, and diffraction; Dispersion relations in plasma; Lorentz invariance of Maxwell's equations; Transmission lines and wave guides; Dynamics of charged particles in static and uniform electromagnetic fields; Radiation from moving charges, dipoles and retarded potentials.

Quantum Mechanics

Wave-particle duality; Wave functions in coordinate and momentum representations; Commutators and Heisenberg's uncertainty principle; Matrix representation; Dirac's bra and ket notation; Schroedinger equation (time-dependent and time-independent); Eigenvalue problems such as particle-in-a-box, harmonic oscillator, etc.; Tunneling through a barrier; Motion in a central potential; Orbital angular momentum, Angular momentum algebra, spin; Addition of angular momenta; Hydrogen atom, spin-orbit coupling, fine structure; Time-independent perturbation theory and applications; Variational method; WKB approximation; Time dependent perturbation theory and Fermi's Golden Rule; Selection rules; Semi-classical theory of radiation; Elementary theory of scattering, phase shifts, partial waves, Born approximation; Identical particles, Pauli's exclusion principle, spin-statistics connection; Relativistic quantum mechanics: Klein Gordon and Dirac equations.

Thermodynamic and Statistical Physics

Laws of thermodynamics and their consequences; Thermodynamic potentials, Maxwell relations; Chemical potential, phase equilibria; Phase space, micro- and macrostates; Microcanonical, canonical and grand-canonical ensembles and partition functions; Free Energy and connection with thermodynamic quantities; First- and second-order phase transitions; Classical and quantum statistics, ideal Fermi and Bose gases; Principle of detailed balance; Blackbody radiation and Planck's distribution law; Bose-Einstein condensation; Random walk and Brownian motion; Introduction to nonequilibrium processes; Diffusion equation.

Electronics

Semiconductor device physics, including diodes, junctions, transistors, field effect devices, homo and heterojunction devices, device structure, device characteristics, frequency dependence and applications; Optoelectronic devices, including solar cells, photodetectors, and LEDs; High-frequency devices, including generators and detectors; Operational amplifiers and their applications; Digital techniques and applications (registers, counters, comparators and similar circuits); A/D and D/A converters; Microprocessor and microcontroller basics.

Experimental Techniques and data analysis

Data interpretation and analysis; Precision and accuracy, error analysis, propagation of errors, least squares fitting, linear and nonlinear curve fitting, chi-square test; Transducers (temperature, pressure/vacuum, magnetic field, vibration, optical, and particle detectors), measurement and control; Signal conditioning and recovery, impedance matching, amplification (Op-amp based, instrumentation amp, feedback), filtering and noise reduction, shielding and grounding; Fourier transforms; lock-in detector, box-car integrator, modulation techniques.

Atomic & Molecular Physics

Quantum states of an electron in an atom; Electron spin; Stern-Gerlach experiment; Spectrum of Hydrogen, helium and alkali atoms; Relativistic corrections for energy levels of hydrogen; Hyperfine structure and isotopic shift; width of spectral lines; LS & JJ coupling; Zeeman, Paschen Back & Stark effect; X-ray spectroscopy; Electron spin resonance, Nuclear magnetic resonance, chemical shift; Rotational, vibrational, electronic, and Raman spectra of diatomic molecules; Frank – Condon principle and selection rules; Spontaneous and stimulated emission, Einstein A & B coefficients; Lasers, optical pumping, population inversion, rate equation; Modes of resonators and coherence length.

Condensed Matter Physics

Bravais lattices; Reciprocal lattice, diffraction and the structure factor; Bonding of solids; Elastic properties, phonons, lattice specific heat; Free electron theory and electronic specific heat; Response and relaxation phenomena; Drude model of electrical and thermal conductivity; Hall effect and thermoelectric power; Diamagnetism, paramagnetism, and ferromagnetism; Electron motion in a periodic potential, band theory of metals, insulators and semiconductors; Superconductivity, type – I and type - II superconductors, Josephson junctions; Defects and dislocations; Ordered phases of matter, translational and orientational order, kinds of liquid crystalline order; Conducting polymers; Quasicrystals.

Nuclear and Particle Physics

Basic nuclear properties: size, shape, charge distribution, spin and parity; Binding energy, semi-empirical mass formula; Liquid drop model; Fission and fusion; Nature of the nuclear force, form of nucleon-nucleon

potential; Charge-independence and charge-symmetry of nuclear forces; Isospin; Deuteron problem; Evidence of shell structure, single- particle shell model, its validity and limitations; Rotational spectra; Elementary ideas of alpha, beta and gamma decays and their selection rules; Nuclear reactions, reaction mechanisms, compound nuclei and direct reactions; Classification of fundamental forces; Elementary particles (quarks, baryons, mesons, leptons); Spin and parity assignments, isospin, strangeness; Gell-Mann-Nishijima formula; C, P, and T invariance and applications of symmetry arguments to particle reactions, parity non-conservation in weak interaction; Relativistic kinematics.

Last Date for Submission of Application: 15.12.2015

**SANT LONGOWAL INSTITUTE OF ENGINEERING AND TECHNOLOGY, LONGOWAL
(Deemed University, Established By: Govt. of India)**

Application for admission in Ph.D. (Full Time/Part Time) programme

1. Name of the Candidate: _____
2. Father's Name: _____
3. Mother's Name: _____
4. Date of Birth: _____
5. Gender: _____
6. Category(SC/ST/OBC/GEN): _____
7. Nationality: _____ Religion _____
8. Admission sought for: Ph.D.programme(Full Time/ Part Time) in Department _____
9. Stream: _____
10. Details of qualifying examinations:
 - M.Tech./M.Sc./M.Phil: _____
 - University/Institute: _____
 - Aggregate Percentage/CGPA: _____
 - Year of passing: _____
11. Details of GATE/NET score (if any)
 - GATE/NET examination Paper: _____
 - GATE/NET score and year: _____
 - GATE/NET rank: _____
12. Contact Details*: Mobile No. _____ Phone No. _____
13. Email*: _____
14. Mailing Address: _____

15. Permanent Address: _____

16. Application fee of Rs. _____ DD No. _____ Dated _____ Bank _____



I hereby declare that all the particulars stated by me in this application are true to the best of my knowledge and belief. I fulfil eligibility conditions for admission and I shall abide by terms and conditions for admission. Also it is entirely my responsibility, at the time of counselling to prove my eligibility for admission of Ph.D.programme in respect of qualification and entitlement for admission against reserve category, if claimed, to the satisfaction of the institute. Further in the event of suppression or distortion of any fact made in my application form, I understand that my candidature is liable for cancellation. I also understand that the decision of the admission committee of SLIET regarding my admission is final and I shall abide by the decision. Further, if admitted, I promise to abide by the rules and norms of the institute.

SIGNATURE OF THE CANDIDATE

Date: _____

Place _____

CHECK LIST

Following must be checked while sending the Application Form:

- | | |
|--|--------|
| 1. Application Form | Yes/No |
| 2. Bank Draft / Cash Receipt | Yes/No |
| 3. Photographs pasted at proper places
(on Application Form & Admit Card) | Yes/No |
| 4. Declaration signed | Yes/No |
| 5. Mobile No. | Yes/No |
| 6. Email id | Yes/No |

Application Fee

Process of registration shall be offline only.

Online Application Fee

- | | | | |
|---|------------------------------------|---|----------|
| - | General & Other Categories (Boys) | : | ₹1200/- |
| - | General & Other Categories (Girls) | : | ₹ 800/- |
| - | SC / ST (Boys and Girls) | : | ₹ 600/*- |

Mode of payment

In cash at SLIET counter or through DD drawn in favour of Director SLIET, payable at Longowal.

SANT LONGOWAL INSTITUTE OF ENGINEERING AND TECHNOLOGY, LONGOWAL
DEEMED UNIVERSITY, ESTABLISHED BY : GOVT OF INDIA



HALL TICKET

NAME: _____

FATHER'S NAME: _____

ROLL NO. _____

Affix here
recent passport
size
photograph

SIGNATURE OF THE CANDIDATE

Admission of Ph.D.(Full Time/Part Time) in Even Semester of the Session 2015-16

Tentative Schedule of Events

Last Date for applying	:	Dec 15,2015 (Monday)
Date of Entrance Test (SET-V)	:	Jan 02, 2016 (Saturday)
Display of list of qualified Candidates	:	Jan 06,2016(Wednesday)
Presentation of Research Proposal/interview:	:	Jan 08, 2016 (Friday)
Declaration of Final Result	:	Jan 12, 2016 (Tuesday)
Registration(with consent of supervisor)	:	15.01.2016(Friday)