INFORMATION BROCHURE

FOR

ADMISSION

TO

DOCTOR OF PHILOSOPHY (Ph.D.)

(Even Semester session 2018-19)

[SET-V]

SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY (SLIET)

(Deemed-to-be-University)

LONGOWAL (DISTT: SANGRUR) – 148106 (PB.) INDIA

(Established by Ministry of Human Resource & Development, Govt. of India)

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APPLICATION FEE FOR PhD ENTRANCE TEST

Mode of registration shall be **ONLINE** only:

Online Application Fee*

- General & Other Categories (Boys) : ₹ 1200/- +GST@18%
- General & Other Categories (Girls) : ₹ 800/- +GST@18%
- SC/ ST (Boys and Girls) : ₹ 600/- +GST@18%

***Bank charges Extra**

Mode of Payment: Net Banking/Debit card/Credit card

IMPORTANT INSTRUCTIONS

The **REGISTRATION PAGE DULY FILLED IN/SIGNED** should be sent through **Registered Post/Speed Post** to:

SET OFFICE,
SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY (SLIET),
LONGOWAL – 148 106, DISTRICT SANGRUR (PUNJAB)

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

Registration page duly filled in/signed can be submitted personally at SET OFFICE, SLIET, Longowal

Help Desk Numbers: (9.00A.M. TO 5.00P.M. on working days): **01672-253136, 253108**
(For ONLINE Application)
Institute Website/ ONLINE Application: ***www.sliet.ac.in/*** ***www.sliet.net.in***

IMPORTANT DATES

- **- Last Date for Receipt of Online Application : Jan. 07, 2019 (Monday)**
- **- Date of Entrance Examination (SET-V) : Jan. 13, 2019 (Sunday)**
- **- Result of Entrance Examination : Jan. 15, 2019 (Tuesday)**
- **- Presentation of Research Proposal/ Interview : Jan. 17, 2019 (Thursday)**
- **- Declaration of Final Result* : Jan. 21, 2019 (Monday)**
- **- Counselling/Registration* : Jan. 23, 2019 (Wednesday)**

** The Dates are tentative/ provisional.*

CHECK LIST

Following must be checked while sending the Application Form:

- I have read the information Brochure and checked my eligibility for the course I am applying for.
- Applied online
- Paid the fee online/offline mode
- Got print out of registration page and sent the signed copy to Chairman SET, SLIET, Longowal, Distt.Sangrur, Punjab-148106, INDIA by the last date

Note:

1. All the details will be available on the Institute Website http://www.sliet.ac.in. & www.sliet.net.in **Candidates are advised to visit the institute website regularly for updates if any. No personal communication/ separate intimation will be provided.**
2. No TA/DA will be provided for appearing in Entrance Test and Interview for SET-V.
3. Accommodation is available on payment basis as per availability.

For any Information Contact:

Dr. P K Singh
Dean (R & C)
Tel. No. 01672-253135, 253136, 253108, 280072
Fax No. 01672-280072, 280057
Email: deanrandc@sliet.ac.in

Ph.D. Entrance Examination [SET-V]
(Even Semester - Session 2018-19)
Date: 13.01.2019 (Sunday)
Time: 11.00-13.00 Hours
Venue: Multipurpose Hall, Mechanical Block, SLIET Longowal

1. 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 to be 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 recognized 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 successfully complete 3 years of ICD with the prescribed credits as per teaching scheme.
- 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.

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 drops-out 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.

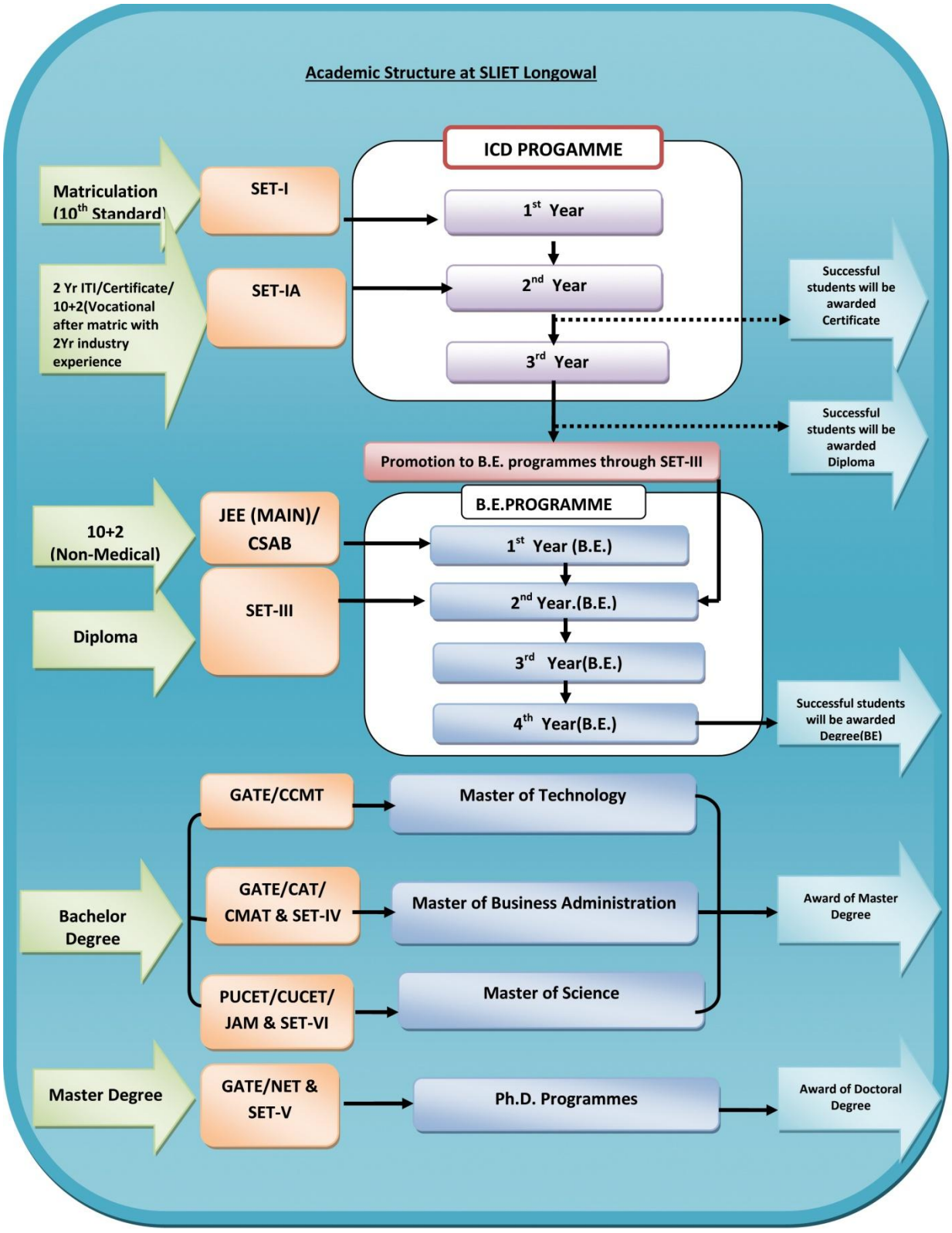
(d) Collaborations:

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 to be 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) B.E. (4-Yr) Courses have been started from session 2014-15.

(e) M. Tech. Courses are recognized by **AICTE, New Delhi** vide F. No. North-West/1- 201645070/ 2014/ EOA Dated 04/06/2014.

(f) 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 in exhaustible 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) 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.

(k) 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.

(l) 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 Yammunanagar, 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 for 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 In-charges.

DIRECTOR

Shailendra Jain, Ph.D.

DEANS

A. S. Arora, Ph.D., Dean (Academics)
D. C. Saxena, Ph.D., Dean (Students Welfare)
Harish Kumar Chopra, Ph.D., Dean (P&D)
J. S. Dhillon, Ph.D., Dean (SFW)
P. K. Singh, Ph.D., Dean (R & C)

DEPARTMENT OF CHEMICAL ENGINEERING

Professor:
H. R. Ghatak, Ph.D.
Kamlesh Kumari, Ph.D.
Pushpa Jha, Ph.D.
Sandeep Mohan Ahuja, Ph.D.

Associate Professor:
Avinash Thakur, Ph.D. (H.O.D.)
Gulshan Kumar Jawa, M.E.

Assistant Professor:
A.S.K. Sinha, Ph.D.
Naveen Kumar Kaushley, M. Tech.
Nikhil Prakash., Ph.D.
Subita Bhagat, M. Tech.
Vinay Kumar, Ph.. D.
Vinod Kumar Meena, M.E.
Amit Rai, Ph.D.

DEPARTMENT OF CHEMISTRY

Professor:
B.K. Kanungo, Ph.D.
Dhiraj Sud, Ph.D.
Harish Kumar Chopra, Ph.D.
Ram Pal Chaudhary, Ph.D.

Associate Professor:
Damanjeet Singh Cannoo, Ph.D. (H.O.D.)

Assistant Professor:
Hemant Kumar, Ph.D.
Himanshu Rani, Ph.D.
Payal Malik, Ph.D.

DEPARTMENT OF COMPUTER SCI. & ENGG.

Associate Professors:
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Damanpreet Singh, Ph.D.
Gurjinder Kaur Cheema, Ph.D.
Major Singh Goraya, Ph.D. (H.O.D)
Manoj Kumar Sachan, Ph.D.

Assistant Professor:
Chandra Shekhar Yadav, M. Tech.
Jaspal Singh, M. Tech.
Manminder Singh, M. Tech.
Preetpal Kaur Buttar, M. Tech.
Rahul Gautam, M. Tech.
Vinod Kumar Verma, Ph.D.

DEPARTMENT OF ELECTRICAL & INSTRU. ENGG.

Professor :
Ajat Shatru Arora, Ph.D.
Jaspreet Singh Dhillon, Ph.D.
Sanjay Marwaha, Ph.D. (H.O.D.)
Vijender Kumar Jain, Ph.D.

Associate Professor:
Anshuka Bansal, M. Tech.
Asim Ali Khan, M. Tech.
Barasha Mali, M. Tech.
Charanjiv Gupta, M.E.
Diljinder Singh, M.E.
Gurmeet Singh, M.E.
Manpreet Kaur, Ph.D.
Manpreet Singh Manna, Ph.D.
Pratibha Tyagi, Ph.D.
Rajinder Kaur, M.Tech.
Sanjeev Singh, Ph.D.
Sunil Kumar, M. Tech.
Surita Maini,Ph.D.
Manmohan Singh, Ph.D.

Assistant Professor:
Ashwani Kumar Aggarwal, Ph.D.
Raj Kumar Garg, Ph.D.

DEPT. OF ELECTRONICS & COMMUN. ENGINEERING

Professor:
Amar Partap Singh Pharwaha, Ph.D.
Anupma Marwaha, Ph.D. (H.O.D)
Jagpal Singh Ubhi, Ph.D.
Surinder Singh, Ph.D.

Associate Professor:
Ajay Pal Singh Chauhan, Ph.D.
Dilip Kumar, Ph.D
Lakhvinder Singh Solanki, Ph.D.

Assistant Professors:
Alka Singla, M. Tech.
Kuldip Singh, M. Tech.
Pankaj Kumar Das, M. Tech.
Sarabjeet Singh, M. Tech.
Vipul Singhal, M. Tech.
Vivek Kumar, M. Tech.

DEPARTMENT OF MANAGEMENT & HUMANITIES

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

Associate Professor:
Sanjeev Kumar Garg, Ph.D.

Assistant Professor:
Mandeep Ghai, Ph.D.

DEPARTMENT OF FOOD ENGG. & TECHNOLOGY

Professor:

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

Associate Professor:

Charanjeev Singh Saini, Ph.D.
Navdeep Jindal, Ph.D

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 Professor:

Raj Kumar Goyal, M.Phil.

Assistant Professor:

Yogesh Kapil, M.Sc.

DEPARTMENT OF MECHANICAL ENGINEERING

Professor:

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

Associate Professor:

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

Assistant Professor:

Ankita Omer, M. Tech.
Anuj Bansal, M.E.
Harish Kumar Arya, Ph.D.
Jonny Singla, M. Tech.
Lalit Ahuja, M. Tech.
Manpreet Singh, M. Tech. (Absenting)
Mohd. Majid, M. Tech.
Surinder Kumar, M. Tech.
Sunil Kumar, M. Tech.
Sumit Kumar, M. Tech.
Vivek Kumar, M. Tech.

DEPARTMENT OF PHYSICS

Professor:

A.S. Dhaliwal, Ph.D.
Kiranjit Singh Kahlon, Ph.D.
K.S. Mann, Ph.D.
M.M. Sinha, Ph.D. (H.O.D.)
S.S. Verma, Ph.D.

Associate Professor :

S.S.Ghumman, Ph.D.

Assistant Professor:

Kanika Aggrawal, M.Sc. M. Tech.
Prabhdeep Kaur, Ph.D.

DEPARTMENT OF CIVIL ENGINEERING

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

DEPARTMENT OF DISABILITIES STUDIES

Mahesh Arora, Ph.D. (H.O.D.)

TRAINING & PLACEMENT CELL

Ravi Kant Mishra, Ph.D.(Head)

WORKSHOP

J. S. Gill, Ph.D. (WS)

CENTRAL LIBRARY

Librarian :

Prithvi Singh Bamnia, Ph.D.
Sanjay Gupta, Ph.D (Admn. Incharge)

SPORTS DEPARTMENT

S.S.Punia, S.P.I., M.P.Ed., N.I.S.

REGISTRAR

Harish Chopra, Ph.D.

Deputy Registrar (Administration):

Harjeet Singh, Ph.D.

Professor Incharge (Accounts):

Sanjay Marwaha, Ph.D

Deputy Registrar (Academics)

Navdeep Jindal, Ph.D.

Incharge (Store & Purchase):

Rakesh Mishra, Ph.D.

Medical Officer:

Devinder Sharma, M.B.B.S. (visiting consultant)
Jasdeep Kaur, M.B.B.S.

In-charge Estate:

Avinash Thakur, Ph.D. (Civil Wing)
Charanjiv Gupta,M.E..(Elect. wing)

Estate Officer:

Sudeep Singh, M.Tech.

A. PhD ENTRANCE EXAMINATION (SET-V)

2.1 Ph.D. PROGRAMME

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 (Full Time/ Part Time) will be strictly as per institute rules. The admission will be done in the following disciplines.

Sr. No.	Department
1.	Chemical Engineering (CHE)
2.	Chemistry (CHY)
3.	Computer Science and Engineering (CSE)
4.	Electrical & Instrumentation Engineering (EIE)
5.	Electronics & Communication Engineering (ECE)
6.	Food Engineering & Technology (FET)
7.	Mathematics (MATH)
8.	Mechanical Engineering (ME)
9.	Physics (PHY)

2.2 ELIGIBILITY

Master's Degree in Engineering / Technology / Science / Humanities / Management with 55% marks (50% for reserved categories) in relevant disciplines ***(MCA degree is not eligible for Ph.D.in CSE).***

(i) Master's Degree holders or a professional degree declared equivalent to the Master's degree by the corresponding statutory regulatory body, with at least 55% marks in aggregate or its equivalent grade 'B' in the UGC 7-point scale (or an equivalent grade in a point scale wherever grading system is followed) or an equivalent degree from a foreign educational Institution accredited by an Assessment and Accreditation Agency which is approved, recognized or authorized by an authority, established or incorporated under a law in its home country or any other statutory authority in that country for the purpose of assessing, accrediting or assuring quality and standards of educational institutions.

(ii) A relaxation of 5% of marks, from 55% to 50%, or an equivalent relaxation of grade, should be allowed for those belonging to SC/ST/PwD (Differently-abled)/OBC (non-creamy layer)/ and other categories of candidates as per the decision of the Commission from time to time, or for those who had obtained their Master's degree prior to 19th September, 1991. The eligibility marks of 55% (or an equivalent grade in a point scale wherever grading system is followed) and the relaxation of 5% to the categories mentioned above are permissible based only on the qualifying marks without including the grace mark procedures.

2.3 ADMISSION

Admission to **Ph.D**. **Programmes** is available in following categories:

(i) Full Time (with fellowship)*
(ii) Full Time (without fellowship)
(iii) Part Time

2.4 FELLOWSHIP

Few Institute fellowships are available and given based on order of merit in final selection to the students admitted under full time Ph.D. program.

* The student in the Full Time (with fellowship) shall be governed by rules and regulation of MHRD, New Delhi letter F.No.17-2/2014-TS-1 dated 28.11.2014 (DST letter Reference no. SR/S9/Z-09/2012 dated 21.10.2014 and F. No. 17-2/2014-TS.1 dated 02.03.2015 & UGC Guidelines dated 17.11.2014) or any other latest instructions issued by MHRD, GOI from time to time.

The guidelines of UGC notification dated 05 May, 2016 shall be applicable to all the candidates.

Reservations will be as per Government of India norms.

2.5 ADMISSION PROCEDURE

(a) Admission to the Ph.D. programmes will be based on **TWO STAGE PROCESS** through:

(i) An **ENTRANCE TEST (SET-V)** shall be **QUALIFYING** with qualifying marks as 50%. The syllabus of the Entrance Test shall consist of 50% of research methodology and 50% shall be subject specific. The Entrance Test shall be conducted at **SLIET only**; and

a) Based on number of candidates to be called for interview, Department can set a higher cut off marks.

b) The PhD Entrance Test (SET-V) will consist of one paper of two hours duration. This paper will have 100 objective type questions (Multiple Choice) of total 100 marks.

(ii) An **INTERVIEW/ PRES$ENTATION/ VIVA-VOCE** wherein the candidates are required to discuss their research interest/area through a presentation or interview/viva-voce before a duly constituted Department Research Committee (DRC)/ Interview Panel. The interview/ presentation/ viva voce shall also consider the following aspects, viz. whether:

- the candidate possesses the competence for the proposed research;
- the research work can be suitably undertaken at the institution/College;
- the proposed area of research can contribute to new/additional knowledge.

(b) The candidates who fulfill the conditions of eligibility criteria can apply online by **07.01.2019.**

(c) The eligible candidates who have qualified GATE/ UGC/CSIR (JRF) NET with fellowship/ NET (ASRB) with fellowship/ State level eligibility test (SLET/SET) with fellowship (**having valid score**) are **exempted from appearing for the entrance examination**, However, they will submit the proof of having qualified the examination with valid score. **But, they have to APPLY ONLINE**. **These candidates have to appear for the interview/presentation/viva voce**.

(d) **MERIT List:** The interview will be applicable to the candidates who qualify SET-V and others who are EXEMPTED **FROM APPEARING** in SET-V as per 2.5(c). The admission will be given based on **MERIT LIST,** prepared on the basis of performance in interview/ presentation/ viva-voce.

(e) Decision of the Interview Panel/ DRC will be final in respect of suitability of candidate and his/ her qualifications for given department.

(f) The course Research Methodology is compulsory for all selected Ph.D. candidates.

(g) 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. The guidelines of UGC notification dated 05 May, 2016 shall be applicable to all the candidates.

(h) For admission under **PART-TIME CATEGORY**, the candidate will have to submit the **NOC** from the employer at the time of counseling.

2.6 SEATS

The number of seats for Full Time with Institute Fellowship are tabulated below. The seats may be increased or decreased as per recommendations of the Interview Panel/ DRC of respective departments at the time of the interview as per suitability of the candidates, and availability of funds. The Director, SLIET reserves the rights not to fill the seats if suitable candidates are not found.

Sr. No.	Department	Full Time with Institute Fellowship	Full time without Fellowship	Part Time
1.	Chemical Engg. (CHE)	05	A few seats are also available under Full time without Fellowship and Part Time category in all the departments subject to recommendation of DRC.	
2.	Chemistry (CHY)	04		
3.	Computer Science & Engg. (CSE)	03		
4.	Electrical & Instrumentation Engg. (EIE)	03		
5.	Electronics & Communication Engg. (ECE)	02		
6.	Food Engineering & Technology (FET)	01		
7.	Mathematics (MATH)	03		
8.	Mechanical Engg. (ME)	03		
9.	Physics (PHY)	02		

2.7 ENTRANCE EXAMINATION SCHEDULE

Test	Date	Time
SET-V (Ph.D.)	13.01.2019 (Sunday)	11.00 – 13.00 Hours

2.8 FEE STRUCTURE for Academic Year 2018-19

	Description	Full Time	Part Time
A. REFUNDABLE FEES: (WITHOUT ANY INTEREST) To be paid at the time of admission	Caution Money Institute/Hostel	5,000	5,000
	Mess Caution Money*	10,000	10,000
	Total (A)	**15,000**	**15,000**
B. NON REFUNDABLE FEES (To be paid at the time of admission)	Admission Related Fee, Students Activity Related Fee & Library Related Fee	5,500	3,500
	Total (B)	**5,500**	**3,500**
C. OTHER FEE PER SEMESTER (Non-Refundable)	Tuition Fee	5,600	5,600
	Other Charges	1,200	200
	Hostel Fee	2,700	2,700
	Total (C)	**9,500**	**8,500**
	Total (A+B+C) (in ₹)	**30,000**	**27,000**

* Applicable to those students only who opt to reside in hostels.

- The examination fee towards submission/ evaluation of thesis as applicable from time to time, shall be charged at the time of submission of thesis.
- The fee structure may be revised from time to time with the approval of competent authority.
- The amount of Group Insurance Scheme (GIS) is to be paid annually by each student as decided by the institute applicable on the date of admission.

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

B. IMPORTANT INFORMATION

3.1 ADMIT CARD

The admit card can be downloaded from student login on or before the day of entrance examination.

3.2 MEDIUM OF EXAMINATION

The medium of entrance examination shall be English only.

3.3 PRINCIPLE OF RESERVATION

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

3.4 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:

(i) Withdrawal:

The candidate has to make a written request to the respective HOD in the prescribed Performa for withdrawal of his / her admission and get the same approved from Dean (R&C).

(ii) Refund of Fee:

After approval of withdrawal of admission from Dean (R&C), 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.

3.5 WOMEN SAFETY

UGC notification dated 02nd May, 2016 (Prevention, Prohibition and redressal of sexual harassment of women employees and students in higher educational institutions) Regulation 2015 shall be applicable in the institute.

3.6 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.

3.7 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.

C. SYLLABUS OF PhD ENTRANCE TEST (SET-V)

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.***

SYLLABUS

Time : 02 Hours

Ph.D. (Chemical Engineering)

Marks: 100 (100 questions)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper(50%)

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; stage-wise 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, ultistage 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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper (50%)

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. Characterization 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, benzynes 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 diastereomericexcess; 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

1. Chemistry in nano-science 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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper (50%)

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 data-path, 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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper (50%)

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 bolding 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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper (50%)

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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper (50%)

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 Mistri

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

Ph.D. (Food Engineering &Technology)

Marks: 100 (100 questions)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper(50%)

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 colorimetry 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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper (50%)

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 streategy-Ans off's growth vector, BCG Model, Porters 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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper (50%)

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 theroem, 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 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, Principle ideal domainsand 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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper Part- A (25 % 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 (25 % 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)

Research Methodology (50%)

Research Aptitude, Reasoning, Data interpretation, information technology, people and Environment, Numerical Ability, Numerical Analysis, Statistics, Communication Ability, Higher education system (Governance, Policy and administration)

Subject Paper(50%)

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.

APPENDIX - I

INSTRUCTIONS FOR FILLING ONLINE APPLICATION FORM AND SENDING THE REGISTRATION PAGE BY POST

(i) Candidate shall log on to **www.sliet.ac.in** and click proceeds for Admission and then registration.

(ii) Click on to **NEW REGISTRATION** and for already registered users, enter Login & Password.

(iii) Before you proceed to register yourself, you must ensure that you have read and understood the eligibility criteria & reservation policy for the COURSE / PROGRAMME you are applying for.

(iv) Candidate should fill his/her basic details like Date of Birth (DOB), Address, State, City, Religion, Contact/ Mobile Numbers and Email very carefully.

(v) Choose your password at least of 6-10 characters. Please remember your password and don't share with others.

(vi) Before final submission of online Application Form, read the declaration given on the website carefully and given your consent on it, failing which you will not be able to complete your registration. So, you must check the information details carefully before final submission of Registration Form.

(vii) Please note that after successfully submitting the Application Form, the candidate will get a SMS on his / her Mobile that will ensure his/her provisional registration successfully with a Form Number and Password. For this, candidate should provide valid mobile number.

(viii) After successfully submitting Online Application Form, kindly note down your Form Number for future reference. The processing of Application Form will begin only after the successful payment of Application Fee.

(ix) Select mode of fee payment. If a candidate opts to pay application fee through e-Challan mode, he/she has to effect the payment of application fee within 48 hrs from the date of registration.

(x) Once the payment is confirmed, the online Registration Page for PRINT shall be available to the candidate.

(xi) Take PRINT of Registration Page.

(xii) OVERWRITING, CUTTINGS, ERASING IN THE REGISTRATION PAGE OR INCOMPLETE REGISTRATION PAGE MAY LEAD TO REJECTION OF FORM AND SHOULD BE AVOIDED. ANY ERROR ARISING ON THIS ACCOUNT SHALL BE THE RESPONSIBILITY OF THE CANDIDATE.

(xiii) The Registration Page duly filled in/signed should be sent to **SET OFFICE, SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY (SLIET), LONGOWAL – 148106 (DISTT. SANGRUR), PUNJAB** in the envelope by Registered/Speed Post only, so as to reach **positively by January 11, 2019**. The candidate must retain photocopy of his/ her filled in Registration Page for future correspondence, if required.

(xiv) If a candidate submits more than one Registration Page, his / her candidature shall liable to be cancelled and debarred for future examination(s). No communication will be sent in this regard.

(xv) **Photograph:** Firmly affix two recent high contrast passport size colored photograph (taken in 3 months) with gum / fevicol (not to be pinned or stapled) in the space provided for it in the Registration Page. The photograph must indicate clearly the name of the candidate along with the date of taking the photograph. It should be without cap or goggles. Spectacles are allowed. **Polaroid photos are not acceptable.** Candidates not complying with these instructions or with unclear photograph are liable to be rejected. Candidates shall keep 10 identical photographs in reserve for use at the time of Entrance Examination / Counselling / Document Verification / Admission.

(xvi) Request for change or correction of any information, once given in the Registration Page, shall not be entertained under any circumstances. The SLIET will not be responsible for any consequences arising out of non-acceptance of any correction / addition / deletion in any particular once filled in the application form, whatsoever the reasons may be.

APPENDIX - II

INSTRUCTIONS FOR FILLING-UP OMR ANSWER SHEET DURING EXAMINATION

OMR Sheet will be given in the examination hall for answering the objective type questions with multiple choice. Please carefully read the following instructions for filling up of this OMR Sheet at the time of entrance test.

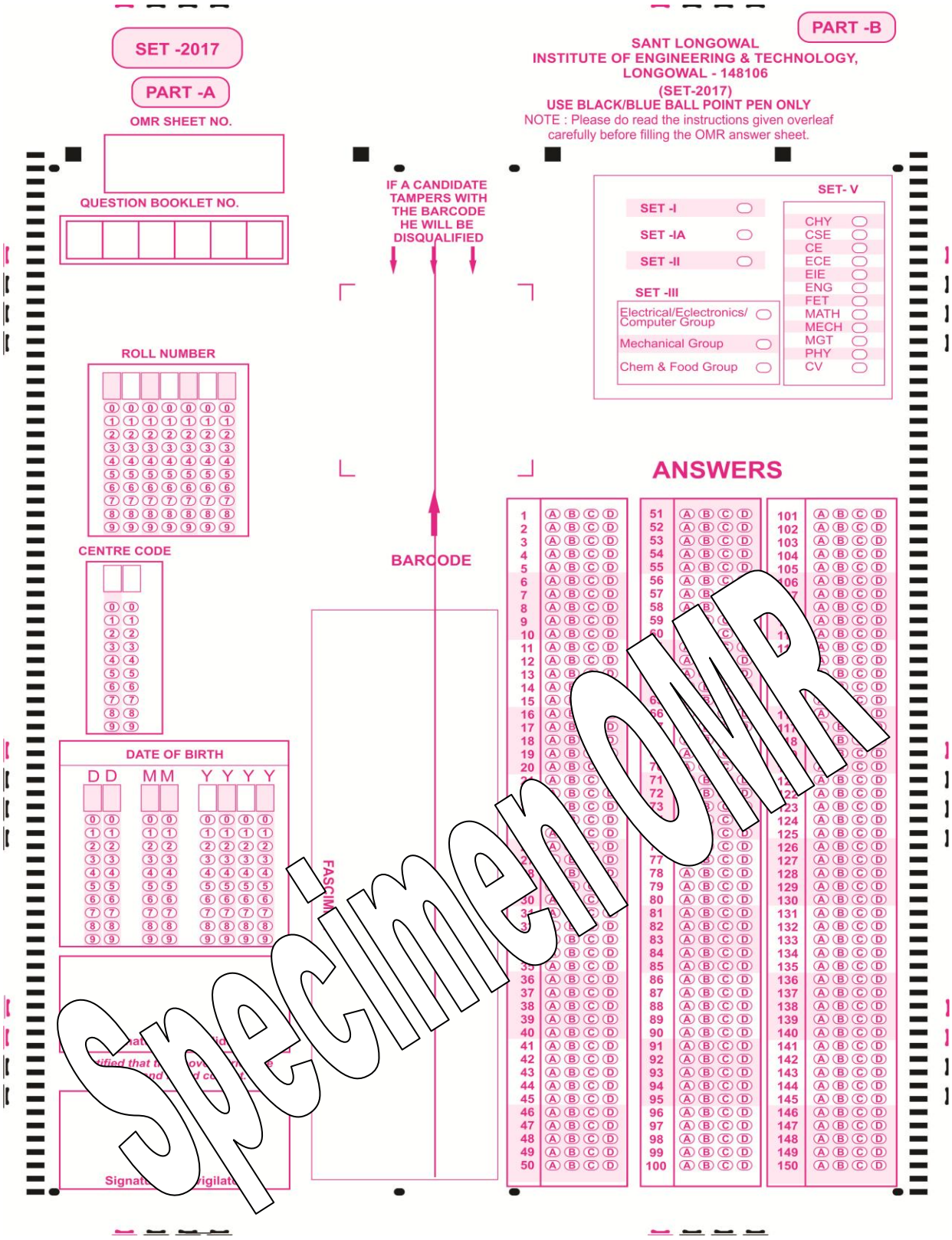
Fill your Question Booklet No., Roll Number, Centre Code No. and Paper No. in Part A. Also put your signature in the box provided for this purpose.

In Part B, give answers of the objective type questions by darkening the suitable circle out of the four given against each question no.

IMPORTANT INSTRUCTIONS

1. Write only rectangular boxes (□) in all items of OMR Answer Sheet with **BLUE/BLACK BALL POINT PEN** and darken the corresponding circle (⬭) completely. with **BLUE PEN ONLY.**
2. Ensure the you have correctly filled up your Roll number, Centre code and after relevant information in the corresponding spaces provided.
3. DO NOT scribble, scratch, cut, tear, fold, wrinkle and not do any rough work on the OMR Answer sheet.
4. Darken only one circle for each answer, if you darken more than one circle, your answer will be treated as WRONG.
5. Answer sheet will be processed by electronic means. Invalidation of answer due to incorrect method of filling will be the sole responsibility of the candidate.
6. **There will be 25% negative marking for wrong Answers for SET I / IA & SET – III. There shall be no negative marking for SET-V (Ph.D).**
7. Use of communication devices such as mobile phone. wireless set etc. is completely prohibited.
8. Use of calculator (except Programmable calculator) is allowed.
9. Method of Darkening Circle.

10. In case you do not follow the above instructions & your answer sheet is liable to be rejected for which ou ourself will be res onsible.



Note: This OMR Answer Sheet is only specimen. The actual OMR may differ.