



YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY FARIDABAD

(Established by Haryana State Legislative Act No.21 of 2009,
Approved by AICTE & Recognized by U.G.C. U/s. 2(f) and 12(B) of U.G.C. Act 1956)

ADMISSION SCHEDULE FOR Ph. D.-2017(Even semester)

KEY DATES

1. Availability of Prospectus and Application Form on University website:
16-10-2017 (Monday).
2. Last date for receipt of Application forms duly filled in for admission at the University:
8-11-2017 up to 4.00 P.M. (**Wednesday**).
3. Availability of the list of the candidates for entrance test and candidates exempted from entrance on University website : 14-11-2017 (Tuesday).
4. Date & Time of Entrance Test: 25-11-2017 (Saturday), 10:00 A.M. -12:00 noon.
5. Declaration of Results: 28-11-2017 (Tuesday).
6. Date of Interview & Counseling by respective Department Chairperson: 30-11-2017(Thursday).
7. Display of list of selected candidates for Ph D admission: 1-12-2017(Friday)
8. Course fee submission by selected candidate: 4-12-2017 (Monday)
9. Date of Commencement of the course work classes: 5-12-2017 (Tuesday).

NOTE:

Application form can be down loaded from University Website i.e. www.ymcaust.ac.in and the filled in application forms to be submitted along with documents and a DD of Rs.1000/- (Rs.500/- for SC / ST Category) in the favour of 'Registrar, YMCAUST Faridabad' payable at Faridabad by 8-11-2017 (4.00 PM).

GENERAL INFORMATION

1. The University is advertising **Ph.D.** for 2017-18 even semester. The Application Form for admission is given at the end.
2. The duly completed Application Form along with all required enclosures should reach the office of the Research Coordinator of the University by the **last date as specified**, at the following address:

Research Coordinator
YMCA University of Science & Technology
Sector-6, FARIDABAD - 121006 (Haryana)

No application will be entertained thereafter.

3. A candidate who furnishes particulars which are found to be false or suppresses material information, will not be considered for admission and if he/ she is admitted on such information, legal action under the law of the land, his/ her admission shall be cancelled as per University rules and all fees deposited by him/ her will stand forfeited.
4. Before accepting the admission, the candidate must also ensure that he/ she fulfills the minimum eligibility conditions. Fee once paid will not be refunded.
5. Students have to fill the Roll No slip given at the end of the form and bring at the time of entrance examination. No separate call letter will be issued by the University.
6. All the admitted candidates will be governed by the Academic Regulation and/ or Ordinance as laid down by the University and amended from time to time.
7. In the case of any inconsistencies in the rules or any clarification thereof, the matter shall be referred to the competent authority for interpretation whose decision shall be final.
8. Detailed ordinance is available at University website.
9. Candidate without depositing the application fee shall not be considered for entrance test.
10. A few selected full-time Ph.D. candidates will be considered for Research Fellowship / Assistantships based on merit.
11. Candidates admitted into Full-time Ph.D. programme should not undertake any assignment/ employment or shall not pursue any other full-time programme of study simultaneously.

12. The candidates enrolled for full time Ph.D. programme have to be a regular scholar for at least three years and after that they may be converted into part time Ph.D. student if desired by the student and recommended by the guide.

Introduction

Ph.D. program was started in YMCA in the year 2010. Till now more than 162 students of 2010, 2011, 2012, 2014 2015, 2016 and 2017 batches are enrolled for Ph.D. programmes in the discipline of Mechanical Engineering, Electrical Engineering, Electronics Engineering, Computer Engineering, Management, Physics, Environmental Sciences and Mathematics.

Fee Structure

At the time of admission:

Fee for Pre Ph.D. Course = Rs 10,000/- (Ten thousand only)

(Candidates must bring a DD of Rs 10,000/- at the time of admission in the favour of “Registrar, YMCAUST, Faridabad” payable at Faridabad).

Seats for Ph.D. Courses

S.No	Name of the Department	No of seats for full time Ph. D	No of seats for Part time Ph. D	No of seats for Industry sponsorship Ph. D	Area(s) in which Ph.D. is offered
1	Mechanical Engineering	16	0	1	Industrial Engineering / Manufacturing, Thermal/Fluid, Material Technology, plastic Manufacturing/Composites
2	Computer Engineering, IT and computer Applications	3	0	1	Information retrieval, software testing, natural language processing, cloud computing, NM, Big data, IOT, adhoc network, Database, Semantic Web, Ad-Hoc Networks, Soft computing, IR (information Retrieval), NLP
3.	Electrical Engineering	8	3	1	Power Electronics & Machine Drives, Renewable Energy, Electrical Machines, Power Quality, FACTS Devices, Power System Optimization &

					Control, Congestion Management , Electric Power Management
4	Electronics Engineering	8	4	1	Semiconductor devices, Wireless communication, Image processing, Networking security, Embedded system, Control System, Analog devices.
5	MBA	3	0	0	Finance and related
6	Mathematics	2	0	0	Applied Mathematics/operation research
7	Physics	05	0	1	Nanotechnology/spectroscopy/plasma physics/ elements/ High energy Physics/material science/Experimental Physics
8	Environmental Sciences	01	0	0	Water and waste water pollution management/ solid waste management
	Total seats	46	07	05	

Note:

The reservation policy of the Haryana Govt. shall be applicable and all the reserved seats are meant for Haryana Domicile candidate only.

Reservation certificate must be signed by Tehsildar of concerned area of Haryana State. Format as per HSTES (www.hstes.in)/Annexure in the Prospectus. **HOGC candidate will also eligible for AIC seat.**

I. Eligibility for full time Ph.D.

A candidate for admission to the course of Ph.D program shall have masters degree 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 where ever 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 institution. The equivalence of the degree will be decided by the Board of Studies (BOS) in the University.

- (i) A relaxation of 5% of marks, from 55% to 50%, or an equivalent relaxation of grade, may be allowed for those belonging to SC/ST/OBC(non-creamy layer)/Differently-Abled and 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.
- (ii) Candidates possessing a Degree considered equivalent to M.Phil. Degree of an Indian Institution, 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, shall be eligible for admission to Ph.D. programme.
- (iii) The candidates who appeared in regular master's level examination in the current session may also appear in the entrance test. But they must submit the proof of having passed the examination on the pre-designated date before admission to the Pre-Ph.D. course.
- (iv) The state reservation policy shall be followed in Ph.D. Admission.
- (v) A candidate provisionally registered for Ph.D. shall be required to attend classes for one semester for a Pre-Ph.D. course.

NOTES:

1. The eligible applicants will have to qualify the Ph.D. Entrance Test (PET). An Entrance Test 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 (**see syllabus attached**). The Entrance test will be of 2 hours duration having 80 multiple choice questions of one mark each.
2. The applicants who have qualified and valid GATE/UGC/NET/CSIR (JRF)/SLET/ passed regular M.Phil Programme in the related discipline are exempted from entrance.
3. The successful applicants i.e. eligible applicants, who will qualify the entrance Test or otherwise exempted shall be tested by the DRC through seminar/ presentation/ interview.

The merit list shall be prepared by Department according to the following criteria:

For Sciences/Management/Humanities

- (a) 40% marks of the percentage of marks in the Master's degree M.Sc./MBA.
- (b) 20 % marks of the percentage of marks in the Bachelor's degree.
- (c) 20% marks in the interview to be conducted by the respective Department.
- (d) 10% marks (02 marks per year experience subject to max.10 marks).
- (e) 10% marks (02 marks for each publication in Journals listed by UGC subject to max.10marks)

For Engineering &Technology

- (a) 40% marks of the percentage of marks in the M.Tech.
- (b) 20 % marks of the percentage of marks in the B.Tech./MCA.
- (c) 20% marks in the interview to be conducted by the respective Department.
- (d) 10% marks (02 marks per year experience subject to max.10 marks).
- (e) 10% marks (02 marks for each publication in Journals listed by UGC subject to max.10marks)

**Where CGPA is awarded and percentage of marks is not mentioned,
Percentage of marks = 9.5 x CGPA**

- 4. No separate admit cards will be issued for the entrance test. Applicants are required to download their admit cards from the University website or can obtain from the office of the Research Coordinator during working hours.
- 5. The LIST OF SUCCESSFUL APPLICANT will be displayed on University website and notice boards. The successful applicants will report to the **Chairperson of the respective teaching department on the scheduled date for interview/Admission.**

II. Eligibility for Part-time Ph.D.

The regular staff of YMCA having two years of experience in YMCA can apply in this category. All the terms and condition regarding eligibility, admission, merit list preparation, interview and course work will be governed by the University Ph.D. ordinance.

III. Eligibility for Industry Sponsored Ph.D.

1. The candidates employed in recognized R&D organizations and desirous of pursuing Ph.D. programme while in employment may apply for admission as external candidates. After fulfilling the residential requirement and completing the course work at the Institute, these candidates will be allowed to register for Ph.D. with a Supervisor (internal) from the Institute and a Co supervisor (external) from their parent organization where they will be doing the research work. The admissions are based on the following norms:

- i. The option of external registration is for applicants who are working in well equipped scientific institutions, laboratories, R&D establishments and industrial organizations engaged in research based activities.
 - ii. An external candidate must have been in service of the sponsoring organization for at least fifteen years at the time of admission.
2. Academic Eligibility and procedure for admission is same as that of full time scholars.
 3. Merit list preparation: The weightage of written test is 60% and that of presentation is 40%.
 4. The candidate should submit at the time of test/interview a Sponsorship Certificate from the organization in which he / she is employed giving an undertaking that the candidate would be released from the normal duties to fulfill the residential requirement for the coursework (and qualifier examination, if applicable). The certificate should also provide details of facilities relevant to the research programme and available to the candidate.
 5. The candidate is required to be at the Institute as a fulltime student for the coursework of his/her Ph.D. Programme. The minimum residence requirement is one semester for students with M.Tech./M.E. or equivalent degree and two semesters for students with B.Tech./B.E./M.Sc. or equivalent degree. However the conditions may be relaxed as per UGC guidelines 2016.
 6. The Ph.D. registration of an external candidate would be reviewed at the end of each year from the date of registration in terms of his progress in courses / seminars / approved research programme by a Research Advisory committee (RAC).
 7. The course work for such persons can be in their parent organization after signing an MOU with that research organization however the design of the curriculum and examination work will be conducted by the University.

8. The candidate has to meet at least twice a month to the research supervisor of the University and that record should be maintained by the University.
9. The candidate has to follow all the other regulations laid by the University time to time.
10. Evaluation and assessment and submission of thesis: As per the ordinance

SYLLABUS FOR Ph.D. ENTRANCE-2017-18

Section-A

RESEARCH METHODOLOGY (Common for all branches)

Unit I

Meaning of Research, Research Process and Scope of Research in various disciplines, Scientific methods of research, selecting a topic of research, Ethics in Research, Different research designs and their role

Unit II

Sampling Design, Measurement and scaling techniques, Methods of data collection – questionnaire/schedule; questionnaire designing, interview and observational Methods, Primary and Secondary sources of data collection, Data Preparation, Editing, coding, tabulation, graphic and diagrammatic presentation of data

Unit III

Formulation of Hypothesis Concept; Test of Hypothesis, Parametric tests and non parametric test (chi-square test), Analysis of variance (one way classification)

Unit IV

Multivariate Analysis Techniques: Factor Analysis; Multiple Regression; Correlation Analysis, Cluster analysis, Discrimination Analysis and Conjoint Analysis, Style and Major Ingredients of a report format

Section- B

(I) MECHANICAL ENGINEERING

Applied Mechanics and Design

Engineering Mechanics:

Equivalent force systems, free-body concepts, equations of equilibrium, trusses and frames, virtual work and minimum potential energy. Kinematics and dynamics of particles and rigid bodies, impulse and momentum, energy methods, central force motion.

Strength of Materials:

Stress and strain, Elastic constants, stress-strain relationship, Mohr's circle, deflection of beams, bending and shear stress, shear force and bending moment diagrams, torsion of circular shafts, thin thick cylinders, Eulers theory of columns, strain energy methods, thermal stress.

Theory of machines:

Analysis of plane mechanisms, dynamic analysis of slider-crank mechanism, planer cams and followers, gear tooth profiles, kinematics and design of gears, governors and flywheels, balancing of reciprocating and rotating masses.

Vibrations:

Free and forced vibrations of single degree freedom systems, effect of damping, vibration isolation, resonance, critical speed shafts.

Design of Machine Elements:

Design for statics and dynamic loading, fatigue strength, failure theories, design of bolted, riveted and welded joints, design of shafts and keys, design of spur gears, brakes and clutches, rolling and sliding contact bearings, belt, ropes and chain drives.

Thermal Science/ Thermal Engineering

Fluid Mechanics:

Fluid properties, fluid statics, manumetry, buoyancy, control-volume analysis of mass, momentum and energy, fluid acceleration, differential equation of continuity and momentum. Bernouli's equation. Viscous flow of incompressible fluids; boundary layer, flow through pipes, head losses in pipes, bends etc.

Turbo machines:

Velocity triangles Euler's equation, specific speed, Pelton wheel, centrifugal pump, Francis and Kaplan turbines.

Heat-Transfer:

Modes of heat transfer, one dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins, dimensionless parameters in free and forced convective heat layer, effect of turbulence, radioactive heat transfer, black and grey surfaces shape factors, network analysis, heat exchanger performance, LMTD and NTU methods.

Thermodynamics:

Zeroth, first and second laws of thermodynamics, thermodynamic system and processes, irreversibility and availability, behaviour of ideal and real gases, properties of pure substances, calculation of work and heat in ideal processes. Analysis of thermodynamics cycles related to energy conversion. Carnot, Rankine, Otto, Diesel, Brayton and Vapour compression cycle.

Steam engineering:

Steam generators, Steam engines, steam turbines-impulse and reaction, velocity diagrams, compounding, reheat factor.

I.C. Engines:

Requirements and suitability of fuels in IC engines, fuel ratings, fuel- air mixture requirements, normal combustion in SI and CI engines, engine performance calculations, components of gas turbine.

Reciprocating Air Compressor:

Isothermal, adiabatic and polytropic compression, staging the compression process, intercooling and aftercooling, minimum work requirement, volumetric efficiency. Centrifugal and axial flow compressors.

Refrigeration and air-conditioning:

Refrigerant compressors, expansion devices, condensers and evaporators, properties of moist air, psychometric chart, basic psychometric processes.

Manufacturing and Industrial Engineering**Engineering materials:**

Structure and properties of engineering materials and their applications, heat treatment.

Metal casting:

Casting processes- pattern making, moulds and cores, solidification, design of casting, casting defects.

Metal working:

Stress-strain diagrams for ductile and brittle material, plastic deformation, mechanisms, fundamentals of hot and cold working processes-forging, extrusion, wire drawing, sheet metal working, punching, blanking, bending, deep drawing, coining and spinning.

Machining Processes and Machine Tool Operation:

Mechanics of metal cutting, single and multipoint cutting tools, geometry and machining aspects, tool life, machinability, economics of machining, non- traditional machining processes.

Metrology and Inspection:

Limits, fits and tolerances, linear and angular measurements, comparators, gauge design interferometry, form and finish measurement, measurement of screw threads, alignment and testing methods.

Tool Engineering:

Principles of work holding, design of jigs and fixtures, design of press working tools.

Manufacturing Analysis:

Part-print analysis, tolerance analysis in manufacturing and assembly, time and cost analysis.

Computer Integrated Manufacturing:

Basic concepts of CAD, CAM, Group technology.

Work Study:

Method study, work measurement time study, work sampling, job evaluation, merit rating.

Production planning and control:

Forecasting models, aggregate production planning, master scheduling, materials requirements planning.

Inventory control:

Deterministic and probabilistic models, safety stock inventory control systems.

Operations Research:

Linear programming, simplex and duplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

(II) ELECTRICAL ENGINEERING

Power System

Transmission line parameters: Representation of short, medium, and long transmission lines- ABCD Parameters, Circle Diagram, per Unit representation, 3- Φ system, Short Circuit Studies, Sequence Network, Load- Flow Studies- Gauss Seidel method, Newton- Raphson Method, Automatic Generation Control, Load- Frequency Control, Automatic Voltage Regulator, Power system Stability- Equal area criteria, Swing Equation, Optimal Load Dispatch in Power System. Protection Schemes for Transformer, Generators and Transmission Lines.

Power Electronics and Drives

Characteristics and ratings of different thyristor family devices, their turn on and off methods with their protection, series and parallel connection of SCRs and their derating.

controlled single phase and three phase rectifiers for different types of load viz R, R-L, R-L-E, single phase and three phase voltage source and current source inverter, choppers, PWM techniques, Characteristics and principle of AC and DC Machines, Methods of conventional controls and application of static controls and microprocessor based controls for AC and DC machines.

Control and Instrumentation

Mathematical Modeling of physical systems, Transfer function of linear systems. Steady state errors and error constants, static coefficients Time domain analysis. Stability of control system. Routh- Hurwitz's stability criterion. Root locus plots, analysis of control system by root loci. Relationship between time and frequency response, Polar plot, Bode's Plot. Nyquist plot and Nyquist stability criterion. Relative Stability. Phase and Gain Margins. Constant M and N circle. Design of Feedback Controllers. Design of proportional, integral, Derivative, PI, PID controllers of first, second order systems. Control loop with auxiliary feedback. Feed forward control, Practical Controller tuning tips. Ziegler-Nichol's tuning methods. Compensation design using Bode Diagram and Root Locus technique. Reshaping the Root Locus. Cascade Lag, Lead

and Lag-Lead compensators. State Variable concepts. State model , State transition matrix, conversion of state - variable modes to transfer functions, conversion of transfer function to canonical state- variable models, solution of state equation, concepts of controllability and observability, stability improvement by state feedback, Necessary and sufficient conditions for arbitrary pole placement, State regulator theory, design of state observer Servo Design. Introduction of reference input by feed forward control. Recent advances in control system design technologies.

Classification of Instruments, Moving Iron, Moving Coil, Permanent magnet and Dynamometer types. Thermal, Electrostatic Rectifier Instruments, transformers, CT, PT, Power measuring instruments, power factor, frequency meters and synchroscope.

Measurement of low, medium and high resistances AC and DC measuring bridges, Magnetic measurement. General Transducers voltage, current phase angle, optical Hall effect and industrial transducers Electronic voltmeters, Vacuum tube Voltmeter (VTVM) data acquisition system. Spectrum analyses, sensors measuring or sensing devising in different application, Generalized performance characteristics of the measuring instruments. Physical and chemical sensors, principle of working of physical and chemical sensors , interface electronics circuits for instruments/ sensor for data manipulation , transmission and recording computer aided measurement of voltage current power energy frequency phase angle. High voltage measurement.

(III) ELECTRONICS AND COMMUNICATION ENGINEERING

Networks:

Network graphs: matrices associated with graphs; incidence, fundamental cut set and fundamental circuit matrices. Solution methods: nodal and mesh analysis. Network theorems: superposition, Thevenin and Norton's maximum power transfer, Wye-Delta transformation. Steady state sinusoidal analysis using phasors. Linear constant coefficient differential equations; time domain analysis of simple RLC circuits, Solution of network equations using Laplace transform: frequency domain analysis of RLC circuits. 2-port network parameters: driving point and transfer functions. State equations for networks.

Electronic Devices:

Energy bands in silicon, intrinsic and extrinsic silicon. Carrier transport in silicon: 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, n-tub, p-tub and twin-tub CMOS process.

Analog Circuits:

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 circuits:

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 shiftregisters. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor(8085): architecture, programming, memory and I/O interfacing.

Signals and Systems:

Definitions and properties of 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 Systems:

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.

Communications:

Random signals and noise: probability, random variables, probability density function, autocorrelation, 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 and GSM.

Electromagnetics:

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. Basics of Antennas: Dipole antennas; radiation pattern; antenna gain.

(IV) COMPUTER ENGINEERING/ IT AND COMPUTER APPLICATIONS

Digital Logic: Logic functions, Minimization,; Number representation and computer arithmetic (fixed and floating point).

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

Algorithms: Asymptotic notation & Analysis, 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. Basic concepts of complexity classes - P, NP, NP-hard, NP-complete.

Theory of Computation & Compiler Design: Regular languages and finite automata, Context free languages and Push-down automata, Lexical analysis, Parsing.

Operating systems: Processes, Threads, Inter-process communication, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory

Databases: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL)

Software Engineering: Process models, Software design concepts: coupling & cohesion, testing methods: white box, black box.

Computer Networks: ISO/OSI stack, TCP/IP model, Basic concepts of hubs, switches, gateways, and routers. Network security - basic concepts of public key and private key cryptography, digital signature, firewalls.

Web technologies: HTML, XML, basic concepts of client-server computing.

(VI) MATHEMATICS

Algebra :

Groups, homomorphism, Sylow theorems. Rings and fields. Vector spaces, subspaces, linear dependence, basis and dimension. Linear transformation, range space, null space, rank and nullity. Matrix representation of a linear transformation. Change of basis. Eigenvalues and eigenvectors. Inner product, orthogonality, Gram-Schmidt process, orthogonal expansion. Quadratic forms, reduction to normal form.

Analysis :

The real number system. Sequences, series and uniform convergence. Continuity and differentiability of functions of real variable. Riemann and Lebesgue integrals. Analytic function, Cauchy Riemann equations, Cauchy's theorem and integral formula, singularities, Taylor's and Laurant's series. Cauchy's residue theorem and applications.

Metric spaces. Cauchy sequences and convergence. Completeness. Normed space. Banach space. Inner product space. Hilbert space.

Differential Equations :

Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations. Second order linear differential equations. Variation of parameters. Systems of linear equations. Solution by matrix method. Laplace transform methods. Applications. Sturm-Liouville problem. Green's function. First and second order partial differential equations. Method of separation of variables for Laplace, heat and wave equations.

Operations Research :

Linear programming problems, convex set, convex functions, Simplex method and its variants, duality, sensitivity analysis. Transportation problems, initial basic feasible solution and optimal solution, degeneracy. Assignment problems, applications of TP and AP. Nonlinear programming problems, Kuhn-Tucker conditions.

Numerical Analysis :

Approximation of functions, their derivatives and integrals by interpolation. Finite and divided differences. Iterative methods for solving nonlinear and linear equations, convergence. Power method for largest eigenvalue. Numerical Solution of ordinary differential equations. Initial value problems by Runge-Kutta and predictor-corrector methods. Boundary value problems by finite difference methods and method of weighted residuals. Numerical Solution of Laplace and Poisson equations.

(VII) PHYSICS

1. Mathematical Physics :

Linear vector space; matrices; vector calculus; linear differential equations; elements of complex analysis; Laplace transforms, Fourier analysis, elementary ideas about Tensors.

2. Classical Mechanics :

Conservation laws; central forces, Kepler problem and planetary motion; collisions and scattering in laboratory and centre of mass frames; mechanics of system of particles; rigid body dynamics; moment of inertia tensor; non inertial frames and pseudo forces, Lagrange's and Hamilton's formalisms; equation of motion, cyclic coordinates, Poisson bracket; periodic motion, small oscillations, normal modes; wave equation and wave propagation; Lorentz transformations, relativistic kinematics, mass-energy equivalence.

3. Electromagnetic Theory :

Solution of electrostatic and magnetostatic problems Laplace and Poisson equations; conductors and dielectrics; boundary value problems; Ampere's and Biot-Savart's laws; Faraday's law; Maxwell's equations, Electromagnetic waves and their reflection, refraction, interference, diffraction and polarization, 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, Poynting vector, Poynting theorem, energy and momentum of electromagnetic waves. Special theory of relativity; Lorentz transformations, relativistic kinematics, mass-energy equivalence.

4. Quantum Mechanics :

Physical basis of quantum mechanics; Wave-particle duality; uncertainty principle; Schrodinger equation; one, two and three dimensional potential problems; particle in a box, harmonic oscillator, hydrogen atom; linear vectors and operators in Hilbert space; angular momentum and spin; addition of angular momenta, 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 scattering theory, phase shifts, partialwaves,

Born approximation; Identical particles, Pauli's exclusion principle, spin-statistics connection, Relativistic quantum mechanics: Klein Gordon and Dirac equations.

5. **Atomic and Molecular Physics :**

Spectra of one- and many-electron atoms; Stern-Gerlach experiment, LS and JJ coupling; hyperfine structure; Zeeman and Stark effects; electric dipole transitions and selection rules; rotational and vibrational spectra of diatomic molecules; electronic transition in diatomic molecules, Franck-Condon principle; Raman effect; NMR and ESR; Lasers-spontaneous and stimulated emission, optical pumping, population inversion, coherence (temporal and spatial) simple description of Ruby laser, CO₂ and He-Ne Lasers, optical fibers.

6. **Thermodynamics and Statistical Physics :**

Laws of thermodynamics and their consequences; macrostates and microstates; phase space; probability ensembles; partition function, free energy, calculation of thermodynamic quantities; classical and quantum statistics; degenerate Fermi gas; black body radiation and Planck's distribution law; Bose-Einstein condensation; first and second order phase transitions, critical point, Random walk and Brownian motion; Introduction to non-equilibrium processes; Diffusion equation.

7. **Condensed Matter Physics:**

Crystal classes and systems, 2d & 3d lattices, Bonding of common crystal structures, unit cells, Miller indices, reciprocal lattice, diffraction methods for structure determination; concept of amorphous, single and polycrystalline structures and their effect on properties of materials. crystal growth techniques, elastic properties of solids; defects in crystals; lattice vibrations and thermal properties of solids; free electron theory; band theory of solids; metals, semiconductors and insulators; transport properties; optical, dielectric and magnetic properties of solids; elements of superconductivity, meissner effect, Type – 1 and Type – 2 super conductions, BCS, pairing mechanism, nanomaterials.

Dielectric properties - dielectrics ; polarization mechanisms, Clausius – equation, plezo, pyto and ferro – electricity.

Magnetism in materials - dia and para magnetism; exchange interactions, magnetic order, ferro, anti – ferro and ferrimagnetism.

8. **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, iso-spin, 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.

9. **Electronics:**

Semiconductor devices, including diodes, junctions, transistors, field effect devices, homo and hetero junction devices, device structure, device characteristics, frequency dependence and applications; optoelectronic devices, including solar cells, photo detectors, and LEDs; high-frequency devices, including generators and detectors; operational amplifiers and their applications; digital techniques and applications (flip-flops, registers, counters, comparators and similar circuits); basic digital logic circuits, A/D and D/A converters; microprocessor and microcontroller basics.

10. **Characterization techniques :**

X-ray diffraction, scanning electron microscopy, differential scanning calorimetry.

(VIII) ENVIRONMENTAL SCIENCE

- Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere.
- Natural resources, conservation and sustainable development
- Chemical compositions of Air: Classification of elements, Particles, Ions and radicals in atmosphere, chemical processes for formation of inorganic and organic particulate matter, thermo-chemical and photochemical reaction in atmosphere, Oxygen and Ozone chemistry, chemistry of air pollutants , photochemical smog
- Water Chemistry: Chemistry of water, Concept of DO, BOD, COD.
- Soil Chemistry: Inorganic and organic components of soil, Nitrogen pathways and NPK in soils
- Toxic Chemicals in the environment- Arsenic, Cadmium, Lead, Mercury, Carbon monoxide, Ozone and PAN, pesticides, insecticides and carcinogens.
- Ecosystem: Structure and functions, Abiotic and biotic components, energy flows, food chains, Food web, Ecological pyramids, types and diversity; Ecological succession, population, community ecology ad Parasitism, Prey predator relationships
- Common Flora and fauna in India; Endangered and Threatened Species
- Biodiversity and its conservation: definition, Hotspots of biodiversity, Strategies for biodiversity conservation, National parks and Sanctuaries, gene pool
- Earth Process and Geological hazards, including floods, landslide, earthquakes, volcanism and avalanche.

- Mineral Resources and environment; Trace elements and health, Epidemiological issues (Goitre, Fluorosis and Arsenic)
- Principles of remote sensing and its application of environmental science; Application of GIS in environmental Management
- Non-conventional sources of energy: Hydroelectric power, tidal, Ocean thermal energy conversion, Wind, Geothermal energy, Solar collector, Photovoltaic, solar pond, nuclear energy-Fission and fusion, Bio-energy from biomass and biogas, Anaerobic digestion, energy use pattern in different parts of the World; Environmental implication of energy uses. Fossil fuels.
- AIR: Natural and anthropogenic source of pollution, Primary and Secondary pollutants, Methods of monitoring and control of air pollution SO₂, NO_x, CO, SPM, effects of pollutant on human beings, plants, animals, material and on climate, Acid rain, Air Quality standards; Vehicular pollution
- Global environmental problems-Ozone depletion, global warming and climatic change
- Water: types, Sources and consequences of water pollution, Physico-chemical and Bacteriological sampling and analysis of water quality, Sewage waste water treatment and recycling .Water quality standards; Eutrophication and restoration of Indian lakes; Rain water harvesting
- Soil: Physico-chemical and Bacteriological sampling as analysis of soil quality, Soil pollution control, Desertification and it's control; Wet lands conservation
- Noise: Sources of noise pollution Measurements of noise and indices, Noise exposure levels and Standards. impact of noise on human health
- Marine pollution and control, Radioactive and thermal Pollution
- Impact Assessment Methodologies; Guidelines for Environmental Audit
- Concept and strategies of sustainable development; Environmental priorities in India and Sustainable development
- Sources and generation of solid waste, their characteristics, chemical composition and classification, Different methods of disposal and management of solid waste (Hospital Waste and Hazardous waste) recycling of waste material. Waste minimization technologies

(IX) MANAGEMENT STUDIES

Unit—I

Managerial Economics-Demand Analysis
Production Function
Cost-output relations
Market structures
Pricing theories
Advertising
Macro-economics
National Income concepts
Infrastructure—Management and Policy
Business Environment
Capital Budgeting

Unit—II

The concept and significance of organisational behaviour—Skills and roles in an organisation—Classical, Neo-classical and modern theories of organisational structure—Organisational design—Understanding and Managing individual behaviour personality—Perception—Values—Attitudes—Learning—Motivation. Understanding and managing group behaviour, Processes—Inter-personal and group dynamics—Communication—Leadership—Managing change—Managing conflicts.
Organisational development

Unit—III

Concepts and perspectives in HRM; HRM in changing environment
Human resource planning—Objectives, Process and Techniques
Job analysis—Job description
Selecting human resources
Induction, Training and Development
Exit policy and implications
Performance appraisal and evaluation
Potential assessment
Job evaluation
Wage determination
Industrial Relations and Trade Unions
Dispute resolution and Grievance management
Labour Welfare and Social security measures

Unit—IV

Financial management—Nature and Scope
Valuation concepts and valuation of securities
Capital budgeting decisions—Risk analysis
Capital structure and Cost of capital
Dividend policy—Determinants
Long-term and short-term financing instruments
Mergers and Acquisitions

Unit—V

Marketing environment and Environment scanning; Marketing Information Systems and Marketing research; Understanding consumer and industrial markets; Demand Measurement and Forecasting; Market Segmentation—Targeting and Positioning; Product decisions, Product mix,

Product Life Cycle; New product development; Branding and Packaging; Pricing methods and strategies.

Promotion decisions—Promotion mix; Advertising; Personal selling; Channel management; Vertical marketing systems; Evaluation and control of marketing effort; Marketing of services; Customer relation management;

Uses of internet as a marketing medium—other related issues like branding, market development, Advertising and retailing on the net.

New issues in Marketing.

Unit—VI

Role and scope of production management; Facility location; Layout planning and analysis; Production planning and control—production process analysis; Demand forecasting for operations; Determinants of product mix; Production scheduling; Work measurement; Time and motion study; Statistical Quality Control.

Role and scope of Operations Research; Linear Programming; Sensitivity analysis; Duality; Transportation model; Inventory control; Queuing theory; Decision theory; Markov analysis; PERT/CPM.

Unit—VII

Probability theory; Probability distributions—Binomial, Poisson, Normal and Exponential; Correlation and Regression analysis; Sampling theory; Sampling distributions; Tests of Hypothesis; Large and small samples; t , z , F , Chi-square tests.

Use of Computers in Managerial applications; Technology issues and Data processing in organizations; Information systems; MIS and Decision making; System analysis and design; Trends in Information Technology; Internet and Internet-based applications.

Unit—VIII

Concept of corporate strategy; Components of strategy formulation; Ansoff's growth vector; BCG Model; Porter's generic strategies; Competitor analysis; Strategic dimensions and group mapping; Industry analysis; Strategies in industry evolution, fragmentation, maturity, and decline; Competitive strategy and corporate strategy; Transnationalization of world economy; Managing cultural diversity; Global Entry strategies; Globalisation of financial system

and services; Managing international business; Competitive advantage of nations; RTP and WTO.

Unit—IX

Concepts—Types, Characteristics; Motivation; Competencies and its development; Innovation and Entrepreneurship; Small business—Concepts Government policy for promotion of small and tiny enterprises; Process of business opportunity identification; Detailed business plan preparation; Managing small enterprises; Planning for growth; Sickness in Small Enterprises; Rehabilitation of sick enterprises; Intrapreneurship (organisational entrepreneurship).

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY
Sector 6, Faridabad

APPLICATION FORM FOR ADMISSION TO Ph D 2017-18

Affix a Passport size
Photograph (attested).

Four Passport size
photographs will also
be required at the time
of admission.

Date and time of Entrance Test at YMCA UST Faridabad.
25-11-2017 (Saturday), 10:00 A.M. -12:00 noon.

For Full time Course in:

1.1 Tick the relevant discipline for admission to Ph.D Programme

I) INFORMATION TECHNOLOGY ENGINEERING

II) MECHANICAL ENGINEERING

(III) ELECTRICAL ENGINEERING

IV) COMPUTER ENGINEERING

V) ELECTRONICS ENGINEERING

VI) MATHEMATICS

VII) PHYSICS

VIII) ENVIRONMENTAL SCIENCES

IX) MANAGEMENT STUDIES

X) ENGLISH

2.(i) CATEGORY: General (AIC/HOGC)/(SC/ST,BC, SBC, PH, others) : _____
(Attach attested certificates in format given in Annexure)

(ii) Exempted from ENTRANCE TEST Yes OR No (Attach proof, If Yes as per prospectus):

3. Name of full (in block letters) : _____

4. Father's Name (in block letters) : _____

5. Mother's Name (in block letters) : _____

6. Date of Birth (Attested copy of 10th Certificate) : _____

7. Address for correspondence : _____

Tel.....

Mobile.....

E-

Mail.....
.....

8. Details of Qualifying Examination passed (B.Tech/B.E/Bachelor/MCA and M.Tech/M.E./M.Sc./MBA etc, attach attested copy):-

Examination with discipline	Year	Related roll No.	Marks Obtained	Maximum Marks	%age of Marks	Name of College/ University

9 Number of Research publications in Referred Journal (Attach photocopy as a proof)

10 Employment Record (Attach experience certificate, post qualification exp will be considered only):

Name of Employer's	Period of Employment	Designation & Salary	Nature of Duties

11. **To be produced at the time of Ph.D. interview:** Area, Topic, List of Projects/Publications/Inventions/Patents and a paragraph comprising of maximum 500 words.

12. DD./Receipt No.....Amount..... dated
.....
Bank.....
.....

Signature of the Applicant

DECLARATION BY THE CANDIDATE

I hereby solemnly affirm that all the entries made in this form are correct. I further declare that I fulfill the minimum eligibility conditions laid down for admission. In case of detection of any false entry, especially in respect of degree examination / experience / sponsoring certificate, my admission may be treated as cancelled any time during the course of my study and I will no claim what-so-ever.

I have noted carefully that in case my candidature is not registered by this University on any ground what-so-ever, my admission will be treated as cancelled automatically and I would have no claim for admission in my Ph.D. Course.

Signature of Applicant

DECLARATION BY THE FATHER / GUARDIAN

I hereby certify that my son / daughter / ward _____ submits the application for admission to Ph.D with my knowledge and consent and I hold myself responsible for his good conduct and for his maintenance and payment of fees during the period he/she is on the University Rolls.

Date: _____

Signature of Father / Guardian

NO OBJECTION CERTIFICATE

(To be printed on Letter Head mentioning Tel. no. , Website of organization. Incomplete certificate will not be considered)

Certified that Mr./Ms. _____ S/o / D/o
Shri _____ working as
_____ in the department
of _____ from
(date) _____ is a regular employee of this
department/organization. He /She fulfils the minimum eligibility conditions laid down for admission to this course. The Institute has no objection if the above candidate is selected for Ph.D. He /She will be relieved to join the Ph.D. Degree.

Date_____

No._____

Signature of the Head of Institute
with Stamp

List of documents, which should be attached to the Application Form.

- a) Attested photo copy of certificate showing date of birth.
- b) Attested photocopies of Marks Sheets of qualifying degree examination.
- c) Attested photocopies of qualifying Degree certificate (Graduation/Master, B.Tech & M.Tech.)
- d) Attested photo copy of SC/ST, BC, SBC, EBC,PH Certificate (if applicable).
- e) No Objection Certificate
- f) Character Certificate from Head of Institution last attended.
- g) Medical Fitness Certificate from a Govt. Medical Officer.
- i) Exp. Certificate (only post qualification experience will be considered.)
- j) Copy of publication in referred Journal (if any)

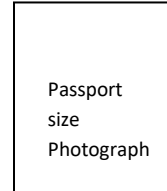
**YMCA University of Science And Technology
Faridabad-121006
Roll no Slip Ph.D Admission – 2017 (Even Semester)**

Name of the candidate

Fathers Name

Roll No.

Exam Centre: YMCA University of Science and Technology



Signature of the Candidate

Signature of the Invigilator

This is a provisional roll number slip subjected to the condition that documents will be verified at the time of admission