

Tribhuvan University
Institute of Engineering
Entrance Examination Board

Detailed Schedule for Entrance Examination of Masters Programs – 2074

Time and Date for Online Application:

From 10 AM, 1stFalgun 2074 (13thFebruary 2018)

To 5 PM, 15thFalgun 2074 (27thFebruary 2018)

Admit card can be downloaded during Falgun17-18, 2074 (March 1-2, 2018) from the website:

<http://entrance.ioe.edu.np> OR www.ioe.edu.np/entrance

Entrance Examination will be held at ICTC, IOE, Pulchowk:

From 19-Falgun 2074 (March 3, 2018)

Publication of Result: By 25th of Falgun, 2074 (By 9th March, 2018)

To be eligible for master's entrance application, the candidate must have passed bachelor degree in relevant subjects with at least second division.

Admission Notice for the successful candidates shall be published by the Admission Committee of Constituent Campuses of IOE. The Academic session starts from 16th Baisakh 2075 (29th April, 2018)

त्रि.वि. इन्जिनियरिङ्ग अध्ययन संस्थानद्वारा शैक्षिक वर्ष २०७४/०७५ मा संचालन गरिने स्नातकोत्तर तहको प्रवेश परीक्षा उत्तीर्ण गर्ने परीक्षार्थीहरू नेपाल सरकार, शिक्षा मन्त्रालयको छात्रवृत्ति सम्बन्धी नियमावली अनुसार तोकिएको कानुनी मापदण्ड पुरा गरेमा सो मन्त्रालयद्वारा २०७४/०७५ मा प्रदान गरिने स्नातकोत्तर तहका उच्च शिक्षाका छात्रवृत्तिहरूका लागि समेत उम्मेदवार हुन योग्य हुनेछन् ।

Online Application

The candidate willing to appear in the entrance examination to get enrollment into the M.Sc. program should fill and submit the Application Form online within the deadline prescribed by the Entrance Exam Board. Application forms will be available in the websites: www.ioe.edu.np/entrance or <http://entrance.ioe.edu.np>. The application procedures are as follows:

1. The candidate should deposit an amount of Rs 2,000 as an application fee for entrance examination in Account No. 00915056064 of the Siddhartha Bank Limited by submitting a specially prepared voucher often by filling applicant's name and date of birth in it. The voucher No. indicated in the voucher needs to be specified in the online application form.
2. The candidate must select the appropriate entrance stream.
3. The candidate should fill up the other required fields in the form without skipping any steps.
4. The candidate also needs to upload his/her color photograph of prescribed specification and one of the following identification documents.
 - Citizenship certificate
 - Passport
 - Last exam admit card

If any change has to be done on the submitted information in application form, candidate has to pay NRs 150 to edit six or less number of normal text fields. For name, photo or ID document correction, he/she has to pay NRs 200 at ICTC and submit a letter of request for correction with the payment voucher

Provision of Admit Cards

Admit card can be downloaded on 17th of Falgun 2074 (1st March, 2018) onwards from the website: <http://entrance.ioe.edu.np>. Applicants should bring the admit card and the mentioned original identification document with him/her during the entrance examination. Without original ID document and color printed admit card, applicant will not be allowed to appear in the entrance examination.

Intake Capacities

The quota distribution for all M.Sc. Programs on current intake capacities is listed in the Table-I while the programs and offering department of constituent campuses are depicted in Table-II.

Table-I: Seats/Quota Distribution for All M.Sc. Programs

Masters Programs	Regular Merit	IOE Reserved	Full Fee	Sponsored	Total Intake
Each Master's program	5	1	6	8	20

Table-II: M.Sc. Programs and Offering Departments

Campus	Master Programs and Started Date	Offered By
Pulchowk Campus, Lalitpur	Information & Communication Engineering (2001)	Department of Electronics and Computer Engineering
	Computer Systems and Knowledge Engineering (2012)	
	Power System Engineering (2001)	Department of Electrical Engineering
	Structural Engineering (1996)	Department of Civil Engineering
	Water Resources Engineering (1996)	
	Environmental Engineering (1996)	
	Geotechnical Engineering (2001)	
	Transportation Engineering (2011)	
	Disaster Risk Management (2011)	
	Construction Management (2013)	
	Hydropower Engineering (Proposed)	Department of Mechanical Engineering
	Renewable Energy Engineering (2001)	
	Energy Systems Planning and Management (2012)	
	Technology and Innovation Management (2010)	
	Mechanical Systems Design and Engineering (2016)	Department of Science and Humanities
	Material Science & Engineering (2014)	
	Climate Change and Development (2013)	
	Applied Mathematics (Proposed)	Department of Architecture
Urban Planning 1996		
Energy for Sustainable Social Development (2015)		
Energy Efficient Buildings (2016)		
Thapathali Campus, Kathmandu	Earthquake Engineering (2014)	Department of Civil Engineering
	Mechanical Engineering Design and Manufacturing (2016)	Department of Mechanical & Automobile Engineering
Paschimnchal Campus, Pokhara	Communications and Knowledge Engineering (2014)	Department of Electronics and Computer Engineering
	Distributed Generation Engineering (2014)	Department of Electrical Engineering
	Infrastructure Engineering and Management (2014)	Department of Civil Engineering
Purwanchal Campu, Dharan	Land and Water Engineering (Proposed)	Department of Civil and Agriculture Engineering

1. One seat in regular category and One seat in full fee category are reserved for female

candidates in each program

2. One seat is reserved for IOE faculty. For IOE Reserved Quota, priority will be given to permanent IOE faculty. If there are no applicants from permanent IOE faculty, then priority will be given to faculties who have completed 5 years as a contract faculty. If there is no applicant in IOE reserve quota, it is added to Full Fee Seat. 1/4th of the sponsored quota is reserved for the Foreign students.
3. Priority for the sponsored quota will be as follows:
1st Priority: Candidates from government offices & Government Owned Organizations or Companies
2nd Priority: Other Organizations
4. If applications are not received in sponsored/foreign category, then the seat will be fulfilled as full fee category.

Provision for the Foreign Students

1/4th of sponsored quota on each program has been reserved for foreign students interested to earn master's degree under IOE. They are eligible only for sponsored (self-sponsored) category and should be admitted as foreign students.

Following are the requirements for foreign students to study at IOE.

1. Students with foreign citizenship are recognized as foreign students and should have passed bachelor degree in engineering with average grade point of at least 'B' or equivalent. (*see section 2 for entry requirements of relevant streams in bachelor to be enrolled into corresponding master's degree program*)
2. Foreign citizens who completed bachelor or equivalent degree from universities within Nepal should appear in the entrance examination by the normal entrance procedure.
3. One recommendation letter from the past University subject instructor/supervisor or mentor if his/her bachelor degree is from foreign university.
4. Transcripts and Degree Certificates of Bachelor of Engineering Degree.
5. One page motivation letter not exceeding 500 words mentioning candidate's interest to study masters at IOE, TU, Nepal.
6. If the bachelor or equivalent degree is from the foreign university, the degree should be accredited by the concerned body of TU before proceeding to admission.

To enroll for the academic year 2018-2020, applicant should submit his/her necessary documents (application form, bachelor transcripts and degree certificates, recommendation letter, motivation letter (Statement of Purpose), scanned copy of 1st page of the passport) via email at admission@ioe.edu.np on or before 27th February, 2018. Candidate will be informed for interview via telephone or online video conferencing.

ENTRY REQUIREMENT AND ADMISSION PROCEDURE

Eligibility Criteria

- To be eligible for the admission to the Master Program, a candidate must fulfill the program entry requirements listed in Table-III.

Table-III: Prerequisite Degree Requirements for M.Sc. Programs

SN	Programs	Entrance Streams	Prerequisite Degree
1.	Urban Planning	PA	B.Arch./B.E Civil or equivalent
2.	Information & Communication Engineering	EC/EE	B.E Electronics/Electrical/Computer) or Equivalent
3.	Structural Engineering	CA	B.E Civil or equivalent
4.	Power System Engineering	EE	B.E Electrical or equivalent
5.	Renewable Energy Engineering	EE/CA/MI	B.E Electrical/ Civil/Agriculture/ Mechanical/ Industrial/Auto-Mobile or equivalent.
6.	Water Resources Engineering	CA	B.E Civil or Agriculture or equivalent
7.	Geo-Technical Engineering	CA	B.E Civil or Agriculture or equivalent.
8.	Transportation Engineering	CA	B.E Civil or Agriculture or Equivalent
9.	Technology and Innovation Management	All except AS	B.E. or Equivalent
10.	Disaster Risk Management	All	B.E in any field/B.Arch./M.Sc. Science
11.	Energy Systems Planning and Management	EE/CA/MI	B.E Electrical/ Civil/ Agriculture/ Mechanical/ Industrial/ Automobile or Equivalent.
12.	Computer System and Knowledge Engineering	EC	B.E Electronics/ Computer or Equivalent
13.	Environmental Engineering	CA	B.E Civil or Agriculture or equivalent
14.	Construction Management	CA/PA	B.E Civil or Agriculture, B.Arch. or equivalent.
15.	Climate Change and Development	All	B.E/B.Sc. Agriculture/ B.Sc. Forestry/ B.Sc. Science(4 years), B.Arch. or equivalent
16.	Material Science & Engineering	All	B.E/ B.Sc. Agriculture/ M.Sc. Science for 3 years bachelor degree/B.Sc. Science(4 years) B.Arch. or equivalent
17.	Energy for Sustainable Social Development	PA/CA/M I	B.Arch./B.E in Civil, Mechanical, Industrial and Agriculture or equivalent
18.	Earthquake Engineering	CA	B.E Civil or equivalent
19.	Infrastructure Planning and Development	CA	B.E Civil or equivalent
20.	Communications and Knowledge Engineering	EC	B.E Electronics & Communication/ Electrical & Electronics/ Computer or Equivalent

SN	Programs	Entrance Streams	Prerequisite Degree
21.	Distributed Generation Engineering	EE	B.E Electrical or Equivalent
22.	Mechanical Engineering Design and Manufacturing	MI	B.E Mechanical/Industrial or Equivalent
23.	Mechanical Systems Design and Engineering	MI	B.E Mechanical/Industrial or Equivalent
24.	Energy Efficient Buildings	PA/CA	B.E Civil, B.Arch. or Equivalent
25.	Applied Mathematics (Proposed)	AS	B.E/ B.Sc. Agriculture/ M.Sc. Science for 3 years bachelor degree/B.Sc. Science(4 years) or equivalent
26.	Hydropower Engineering (Proposed)	CA	B.E Civil or Agriculture or equivalent
27.	Land and water Engineering (Proposed)	CA	B.E Agriculture or Civil or equivalent

- Have undergraduate grades significantly above average and not less than prescribed by the faculty board of IOE, and secure minimum score, as prescribed by the Faculty Board of IOE, in the entrance test conducted by the Entrance Exam Board of IOE.

Note: Equivalence means the same kind of degree obtained from institutes other than TU and recognized by TU as the equivalent to the degree provided by TU in the same discipline.

Mode of Entrance Examination

The candidate should appear in one of the streams (listed in Table-IV) of entrance examination and qualify for admission in relevant Master Program at IOE.

Table-IV: Entrance Streams and Code

S. No.	Entrance Streams	Entrance Code
1	Planning and Architecture	PA
2	Civil & Agriculture Engineering	CA
3	Electrical Engineering	EE
4	Electronics & Computer Engineering	EC
5	Mechanical and Industrial Engineering	MI
6	Applied Science	AS

- Entrance examination will be of Computer Based Multiple Choice Type – of 2 hours duration consisting of two sections. **Section- A** consists of 45 numbers of questions of 50 marks. While **Section-B** consists of stream specialized course with 50 numbers of questions of 1 mark each.
- The Candidates have to secure minimum marks as prescribed by the Faculty Board of IOE.
- All questions will be in English.

- There will be 10% negative marking for wrong answer.
- Non programmable calculators are permitted. Exchange of calculators is strictly prohibited. Candidates have to bring their own calculators in the exam hall.

Selection Process

The Entrance Examination Board of IOE will publish the list of the successful candidates in the entrance examination notice board and via the website whereas the Admission Committee of Constituent campuses will take care of admission procedure.

- ❖ Candidate who has passed the relevant bachelor degree and fulfills the program entry requirements will be selected for the admission on the basis of merit list based on the score of the Entrance examination.
- ❖ Admission committees of respective Campuses will publish the list of admission as per its schedule. The candidates should contact the Campus Admission Committee. All the selected candidates should follow the schedule published by the committee. Vacant seats due to the failure of any candidate to enroll in the prescribed time will be filled by admitting candidates from the consequent next list.

Admission

- ❖ The successful candidate should pay required fee and complete the procedures within the time prescribed by the Admission Committee of the Campuses. Candidates failing to do so will lose the opportunity to get the admission. The following documents should be presented at the time of admission:
 - Original and attested copies of transcripts of all academic records from SLC onwards to the latest approved degree (bachelor/masters).
 - Original copies of migration and provisional certificates, if applicable.
 - Original copy of Nepali citizenship certificate, passport for foreign students
- ❖ In case of discrepancy on verification of the original certificates, or in case of inclusion of the candidate's name in the admission list by mistake of any kind, admission of such a candidate will be cancelled even after his /her formal admission.
- ❖ To be eligible for master's entrance application, the candidate must have passed bachelor degree in relevant subjects with at least second division.

Note:

In any program, if 60% of the full fee and sponsored seats are not fulfilled within admission deadline, that program may be suspended for that academic year and the amount paid by the candidate in the admission process shall be refunded.

CURRICULUM FOR M.Sc. ENTRANCE EXAMINATION - 2074 (2018)

The M.Sc. Entrance examination will be “Computer Based Examination” of two hours duration, consisting of two sections.

Section- A consists of 45 questions of 50 marks. While **Section-B** consists of stream specialized course with 50 questions of 1 mark each. Each question will be of objective type with multiple choice answers and negative marking is 10%.

SECTION-A

The depth of subject matter in this section shall be similar to Bachelor Level.

There may be minor variations in marks distribution.

Communication English **[10]**

1. Critical Reasoning **[6]**

Critical reasoning section aims to test the candidate’s comprehension of the interpretative abilities in English as a language of business and communication. Critical reasoning questions measure your ability to read with understanding, insight and discrimination. These questions explore your ability to analyze a written passage from several perspectives, including your ability to recognize explicitly stated elements as well as underlying statements and their implications. This section measures reading comprehension and critical reasoning skills in multiple-choice format.

The critical reasoning section measures your ability to

- (a) Analyze and evaluate a written text and synthesize information obtained from it.
- (b) Analyze relationships among component parts of sentences.

- Text Completion/Sentence equivalence: [2x1=2]

- Reading Passages: [2x 2 =4]

2. Error Analysis **[2x1=2]**

This section measures your ability to

- Write sentences without any error
- Write proposals, reports, seminars, research article, dissertations, etc. by using most suitable words and technical terms efficiently.

3. Analogies **[2x1=2]**

This section measures your ability to explain the relation between two words.

Mathematics **[40x1]**

The format of the multiple choice questions varies. The solution may require simple computations, manipulations or multi-step problem-solving. These sections aim to test the candidate’s understanding of

Mathematics – A (B-Arch)

1. Basic Mathematics **[4]**

- Sets and Functions,

- Two dimensional and three dimensional Coordinate Geometry,
- 2. Algebra** **[10]**
- Polynomials
 - Complex numbers
 - Sequence and series
 - Permutation and combination
 - Equations and inequalities
 - Matrices and Determinants
 - Linear Programming
- 3. Vector Analysis** **[6]**
- Vector Algebra: Vectors and Scalars, product of two, three and four vectors, reciprocal system
 - Vector Calculus: Gradient, Curl and Divergence
- 4. Calculus** **[13]**
- Limits and Continuity, Ordinary and Partial Differentiation
 - Indefinite and definite Integration
 - Application of Derivatives and Anti-derivatives
 - Ordinary Differential Equations.
- 5. Elementary Statistics and Probability** **[3]**
- 6. Elementary Trigonometry, Logarithm** **[4]**

Mathematics – B (For all except B-arch)

- 1. Basic Mathematics** **[3]**
- Sets and Functions,
 - Two dimensional and three dimensional Coordinate Geometry,
- 2. Algebra** **[8]**
- Polynomials
 - Complex numbers
 - Sequence and series
 - Permutation and combination
 - Equations and inequalities
 - Matrices and Determinants
 - Eigen values and Eigen vectors, Diagonalization of matrix
 - Linear Programming
- 3. Vector Analysis** **[6]**
- Vector Algebra: Vectors and Scalars, product of two, three and four vectors, reciprocal system
 - Vector Calculus: Gradient, Curl and Divergence, line integral, surface integral and volume integral.

- 4. Calculus** [12]
- Limits and Continuity, Ordinary and Partial Differentiation
 - Indefinite and definite Integration
 - Application of Derivatives and Anti-derivatives
 - Ordinary Differential Equations.
- 5. Elementary Statistics and Probability** [3]
- 6. Elementary Trigonometry, Logarithm** [4]
- 7. Transforms: Laplace transform, Fourier Series** [4]

SECTION-B

The depth of subject matter in each subject of stream specialized course shall be that of B.E./B.Arch. level relevant courses offered by T.U.

- Applied Science (AS)** [50x1]
- 1. Mechanical Waves & Oscillations** [5]
- Wave motion: Mechanical wave, Velocity of wave, energy, power & Intensity; stationary wave
 - Acoustic phenomena: Echo & reverberation, beats, modes of vibration in string and pipes
 - Ultrasound: production, applications
- 2. Heat & Thermodynamics** [4]
- Fundamentals of heat: Calorimetry, Change of state
 - Transfer of heat: Conduction, convection and radiation
 - Thermodynamics: Gas laws, kinetic theory of gas, first law of thermodynamics, second law of thermodynamics,
 - Applications: Entropy, heat engines, refrigerators
- 3. Electromagnetic Waves & Oscillations** [8]
- Electric and Magnetic fields: Intensity, potential, potential gradient, capacitors
 - DC and AC Circuit: LR, LC, RC, LR, LCR circuits
 - Maxwell's Equations: Gauss law, Faradays law of electromagnetic induction, Ampere's law & its modification
 - Wave optics: Interference , diffraction , polarization, optical fibers
- 4. Modern Physics** [8]
- Electrons: e , e/m , motion of electron in electric and magnetic fields
 - Photoelectric Effect: Einstein's equation, solar cell, Photovoltaic cell
 - Advanced Materials: Semiconductor, dielectric materials, magnetic materials, superconductor, nano-technology & materials
 - Quantization of energy: Bohr's theory, energy level, wave-particle duality, uncertainty principle, Laser.
 - Radioactivity: radioactive disintegration, fission, fusion

- Energy and Environment: Renewable and non-renewable energy resources, ultraviolet radiation, green-house effect, climate change.

5. Chemistry in Daily Life [3+2]

- Carbohydrates, proteins, enzymes, nucleic acids, drugs and their classifications- antacids, antihistamines, neurologically active drugs- tranquilizers, analgesics, antimicrobials- antibiotics, antiseptics and disinfectants, soaps and detergents.
- Organic and Inorganic polymers, biodegradable and non-biodegradable, conducting polymers

6. Environmental Chemistry [4]

- Water Pollution: Surface and ground water pollution, water pollutants-visible and invisible, chemical and microbiological, their adverse impacts and remedies.
- Air Pollution: Air pollutants, gases SO_x, NO_x, CO_x, O₃, hydrocarbons, particulate-dusts, smokes and fly ash.

7. Water [3]

- Soft and hard, degree of hardness, alkalinity, specification for domestic and industrial purposes, boiler feed water, sludge and scale, water treatment.

8. Catalysts [1]

- Action of catalysts, characteristics and mechanism of catalysis.

9. Electrochemistry [3]

- Electrode potential and its measurements, standard electrode potential, electrochemical cells, electrolytic cells, Nernst equation, EMF of cells, buffer, pH, corrosion, electrochemical series,

10. Applied Chemistry [2+2]

- Fuel and Combustion: classification calorific values, coal, petroleum, kerosene, gasoline, biogas.
- Explosives: classification, preparation and applications.

11. 3d Transition Elements [2]

- Electronic configuration, oxidation states, complex formation, alloy formation and magnetic properties.

12. Isomerism [1]

- Stereoisomerism- geometric isomerism, optical isomerism.

13. Instrumental Technique in Chemical Analysis [2]

- Visible and ultraviolet spectroscopy, nuclear magnetic resonance (NMR), atomic absorption spectroscopy (AAS)

Architecture and Planning (AP) [50×1]

1. Architecture [35]

1.1 History of Architecture [5]

1.1.1 History of Nepalese Architecture

1.1.2 History of Easter Architecture

- 1.1.3 History of Western Architecture
- 1.1.4 History of Contemporary Architecture
- 1.2 Building Material and Technology [5]
 - 1.2.1 Building Material-Brick, Timber, Cement, Stone, Aluminum, Mud etc.
 - 1.2.2 Building Technology - Load Bearing, Frame Structure, different wall, roof, floor, etc.
- 1.3 Building Science [5]
 - 1.3.1 Climatology
 - 1.3.2 Thermal Aspects
 - 1.3.3 Architectural Lighting
 - 1.3.4 Architectural Acoustics
- 1.4 Green Building Design [5]
 - 1.4.1 Green Building Design Concept
 - 1.4.2 Green Building Rating System –LEED, GRIHA, CASBEE, etc.
 - 1.4.3 Passive and active Solar Architecture
 - 1.4.4 Examples of Green Building and Planning
- 1.5 Architecture and conservation [5]
 - 1.5.1 Historical monument and building of Nepal and World
 - 1.5.2 Architectural Conservation of Nepal
- 1.6 Contemporary Architecture of Nepal [5]
 - 1.6.1 Contemporary Architectural practices of Nepal
 - 1.6.2 Problem and way out for future in Nepal
- 1.7 Building Services [5]
 - 1.7.1 Electrical Service – Artificial lighting system, Solar Lighting
 - 1.7.2 Mechanical Service – HVAC, Lift, Escalator, Solar water heating, etc.
 - 1.7.3 Water Supply and Sanitation
- 2. Planning [15]**
 - 2.1 History of Planning – Ancient Town and Settlement [5]
 - 2.2 Urban problems in towns of Nepal [5]
 - 2.3 Urban Environment and Urbanization in Nepal [5]

Civil & Agricultural Engineering (CA) [50 × 1]

1. Structural Engineering [10]

Stresses and strains, Bending and deflection and its equations, Statically determinate structure: displacements by energy principles; static and kinematic indeterminacies; analysis of indeterminate structures; slope-deflection and moment-distribution methods; influence lines for determinate and indeterminate structures; trusses; two and three hinged arches; analysis of trusses and frames; concepts of plastic analysis of beams and frames.

- 2. Geo-technical Engineering** [10]
Phase relationship, soil classification, clay mineralogy, soil compaction, permeability, principal of effective stress, seepage analysis, stress distribution, consolidation, shear strength of soil, stability of slopes, soil exploration, earth pressure theories, rigid and flexible retaining structures, bearing capacity and settlement of shallow foundations, analysis of deep foundation (pile, pier, well), foundation soil improvement.
- 3. Water Resources Engineering** [10]
Physical properties of Fluid, Fluid pressure, Equilibrium stability of floating bodies, Fluid kinematics, Classification of fluid flow, Dynamics of flows, Euler's equation, Bernoulli's equation, Navier stokes equation Boundary layer theory, Momentum equation, Open channel flow, Uniform and Non uniform flow, Energy & momentum principle for open channel flow, Flow in mobile boundary channel, Flow over notches & weirs, Gradually varied flow, Hydraulic Jump and its analysis, Similitude and physical modeling, Physical hydrology, Surface runoff, Rainfall-runoff correlation, Hydrograph Analysis, Unit hydrographs, Peak flow estimation and statistical hydrology, Flood routing.
- 4. Transportation Engineering** [10]
Road transportation in Nepalese context, Highway alignment, Geometric design, Highway drainage system, Highway materials, Traffic Studies, traffic control devices and measures, Road intersection and design, Road pavement, Construction and maintenance of road pavements, Bridge type, site selection, components and protection structures, Tunnel components, requirements and methods of tunneling
- 5. Water Supply & Sanitary Engineering** [10]
Introduction of Water Supply Engineering, Sources of water, Quantity of Water, WHO guidelines, Nepal Drinking water quality standards, Quality of Water, Intake Works, Water Treatments- natural, artificial, Sedimentation, Filtration, Disinfection, Reservoirs and Distribution System, Conveyance of water, Valves and Fittings. Introduction of sanitary engineering, Quantity of Waste Water, Characteristics and Examination of Sewage, Design and Construction of Sewers, Sewer Appurtenances, Sewage Disposal, sewage Treatment, Sludge Treatment and Disposal, Disposal of Sewage from Isolated Buildings, Solid Waste management, WASH and Ecosan.

Electrical Engineering (EE) [50x1]

- 1. Basic Electrical Circuits** [10]
- Network Theorems: Thevenin's, Norton's, Maximum power & Reciprocity Theorems
 - AC circuits: Concept of complex impedance phasor diagram, Active, Reactive & Apparent power, Resonance in AC circuits
 - Three phase circuits: Phase & line quantities in three phase system, 3-phase power

- Transient response: Transient response analysis for R-L, R-C & R-L-C circuit. Pole zero plots
- Two port Networks: Z-parameters, Y-parameters & ABCD –parameters

2. Electrical Machines [10]

- Electromagnets: Magnetic circuits, Fleming's Right hand & Left hand rules, Farady's Law of electromagnetic induction, electromechanical energy conversion principle
- Transformers: Equivalent circuits, Phasor diagrams, Losses & efficiency, Voltage regulations, Instrument transformers, three phase transformer connections, parallel operation of 1-1 & 3-1 Transformers
- Synchronous machine: Operating principle. Effect of Excitation, Power angle characteristics, Phasor diagrams, Losses & efficiency, Voltage regulations, parallel operation of alternator,
- Induction machine Operating principle, T-S Characteristics, Losses and efficiency, Testing, Starting methods, Speed Control
- DC generator: Construction, Operating principle and characteristics of different types dc generator
- DC motor: Operating principle, Characteristics of different types dc motor, Speed control and starter

3. Power Systems [20]

- Transmission line: Line parameters, per unit system representation, single line diagrams, short, medium & long lines, efficiency & regulations.
- Transmission line design: selection of voltage, conductor, sag calculation, stringing chart, line insulators and string efficiency
- Distribution system: Radial and loop distribution, Rural and Urban Distribution system
- Economics of Generation: Load curve, Load duration curve, Diversity factor. Load factor, loss of load factor, tariff schemes,
- Load flow: Bus classification, Y-bus formation G-S & N-R load flow methods
- Stability studies: Swing equations, equal area criterion, Stability enhancement techniques Series & shunt compensations
- Fault calculations: Symmetrical & unsymmetrical faults in power systems, grounded & undergrounded systems, over Voltages in transmission lines, surge arrestors
- Over voltage in transmission line: Temperature over voltage, switching over voltages and lightning overvoltage
- Relays and circuit breakers: Instantaneous & IDMT relays, ABC, VCB & gas circuit Surge arresters brasses, differential & distance protection schemes
- Power control: Load-frequency control, VAR-Volt control
- Safety Engineering: Electric shocks, Equipment Earthing Mat earthing of power stations, measurement of earth resistivity and earth resistances

4. Power Electronics

- Power electronics devices: Diode, IGBT, BJT, MOSFET [10]
- Operational amplifier: Thyristers, GTO, TRAIC
- Rectifiers: Single Phase & three phase rectifiers, uncontrolled and controlled rectifiers
- Inverters: single phase & three phase invertors
- Choppers: Step up and step down choppers, chopper Classifications.

Electronics and Computer Engineering (EC) [50x1]

1. Electrical Circuit and System [5]

- Ohms law, Kirchoff's laws
- Thevenin's Norton's and maximum power transfer theorem
- Active, reactive and apparent power (single & three-phase) and resonance
- Transient and steady state analysis, pole zero plots. two-port parameters.

2. Electronics Circuit and System [10]

- Integrated circuit technology and device models
- Operational Amplifier circuits
- Operational Amplifier characterization
- Power supplies and voltage regulators
- Untuned and tuned amplifiers
- Oscillator circuits
- Digital-to-Analog (DAC) and Analog-to-Digital (ADC) conversion
- Instrumentation and isolation amplifiers
- Operational amplifier-bipolar transistor logarithmic amplifiers
- Log-antilog circuit application
- Communication circuits
- Switched power supplies
- Introduction to power electronics

3. Computer Architecture [10]

- Fundamentals of Computer Architecture & Organization
- Number System
- Boolean Algebra
- Logic Gates
- Combination and Sequential Logic
- A/D and D/A Conversion
- Memory
- Instruction Set
- Operating System and Application Program Concepts
- Computer Applications

4. Computer Networks [5]

5. Communication System [4]

- Analog and Digital Communication Theory and System

6. Object Oriented Programming Language [8]

- Object oriented programming concepts
- Introduction to C++
- Operator Overloading
- Encapsulation
- Polymorphism
- Inheritance
- Templates and file handling

7. Discrete Structure [8]

- Propositional logic and predicate logic
- Methods of proof and formal reasoning
- Binary relations
- Finite state automata
- Recurrence Relation
- Graph theory and graph algorithms

Mechanical & Industrial Engineering (MI) [50x1]

1. Thermodynamics and Heat Transfer [12]

- Equality of Temperature and Zeroth Law of Thermodynamics, Heat Transfer and Work Transfer
- Control Mass and Control Volume Formulation of First Law, Steady State Applications
- Entropy, Second Law of Thermodynamics for an Isolated System, Control Mass and Control Volume Formulation of second law
- Second Law, Entropy Relations and Isentropic Process,. Heat Engine, Heat Pump and Refrigerator
- Carnot Cycle, Brayton Cycle, Rankin Cycle, Otto Cycle, Diesel Cycle, Vapour Compression Cycle
- One dimensional steady state heat Conduction through a plane wall, Radial steady state heat conduction through a hollow cylinder, Heat flow through composite structures, Electrical Analogy for thermal resistance, Convection Fundamentals and Radiation Heat Transfer Fundamentals
- IC Engines

2. Fluid Mechanics and Fluid Machine [10]

- Basic concepts and Fluid and flow
- Flow measurement
- Continuity equation, Momentum equation, Bernoulli's equation and their applications
- Viscous flow, flow inside closed conduits and head losses
- Water turbines
- Turbo machines
- Water Pumps

3. Mechanics and Strength of Materials [12]

- Concept of particles and rigid bodies
- Effect of forces on particles and rigid body

- Applications of equilibrium equations for solving problems of particles and rigid bodies (in 2- Dimensions and 3-Dimensions.)
- Types of structures, statically determinate and indeterminate
- Moments and couples
- Distributed forces, C.G., Centroid, area and Mass moment of inertia,
- Kinematics of particles and rigid bodies
- Equations of motion
- Dynamic equilibrium
- Kinetics of particles and rigid bodies
- Applications of Newton's Second Law
- Application of Principle of Work and Energy
- Principle of Impulse and Momentum
- Conservation of Energy
- Concept of Stress and Strain
- Types of loads and Beams
- Materials Properties and Material Testing
- Shear Force, Bending Moment diagram
- Mechanical Design

4. Energy [8]

- Sources of conventional energy, fossil fuels, calorific values
- Renewable energy sources and their nature
- Basic concepts of: Solar thermal energy, Solar photo-voltaic energy, wind energy, Bio-mass, Geothermal energy and Hydraulic energy
- Consumption and environmental aspects of energy

5. Industrial Engineering and Management [8]

- Classification of manufacturing processes.
- Materials selection criteria
- Elements of cost
- Role of production, operation management and system concepts
- Production planning and control
- Plant location and plant layout design
- Forecasting techniques
- Inventory Control
- Decision making process
- Quality Assurance and Quality Control