



उत्तर प्रदेश जल निगम

प्रधान कार्यालय: 6, राणा प्रताप मार्ग, लखनऊ- 226001

आवेदन पत्र प्राप्ति की अन्तिम तिथि: 01.02.2010

उत्तर प्रदेश जल निगम में आरक्षित वर्ग के बैकलाग को पूर्ण किये जाने हेतु विशेष भर्ती अभियान के अन्तर्गत निम्नलिखित पदों पर नियुक्ति हेतु लिखित परीक्षा कराने के लिए कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर-228118 के माध्यम से आवेदन पत्र आमंत्रित किये जाते हैं।

क्र०सं०	पदनाम	वेतनमान	रिक्तियों का विवरण
			अन्य पिछड़ा वर्ग
1.	सहायक अभियन्ता (वि./यॉ.)	8000-275-13500	06

नोट: रिक्तियों की संख्या आवेदन पत्र प्रस्तुत करने के अनुसार घटाने-बढ़ाने का अधिकार उत्तर प्रदेश जल निगम को होगा।

अनिवार्य अर्हताएं: वे अभ्यर्थी जो दिनांक 01.07.2007 या उससे पूर्व निम्नलिखित अनिवार्य भौक्षिक अर्हताएं पूरी करते हों उपरोक्त बैकलाग परीक्षा में सम्मिलित होने के लिए पात्र होंगे।

अनिवार्य भौक्षिक अर्हताएं:

सरकार द्वारा मान्यता प्राप्त किसी संस्थान या विविद्यालय से विद्युत/यॉंत्रिक अभियन्त्रण में स्नातक अथवा उसके समकक्ष उपाधि या सम्बन्धित अभियन्त्रण में इंस्टीट्यूट ऑफ इंजीनियर्स (इण्डिया) में सहायक अभियन्ता सदस्यता/सदस्यता परीक्षा (एग्रेसिव मेम्बरशिप) के भाग ए एवं भाग बी उत्तीर्ण हो। दूरस्थ शिक्षा के माध्यम से किसी संस्थान या विविद्यालय से प्राप्त विद्युत/यॉंत्रिक अभियन्त्रण में स्नातक उपाधि मान्य नहीं होगी।

अधिमानी अर्हतायें- अन्य भर्तियों के समान होने पर सीधी भर्तियों के मामले में ऐसे अभ्यर्थी का अधिमान दिया जायेगा जिसमें-

1. प्रादेशिक सेना (टेरीटोरियल आर्मी) में न्यूनतम दो वर्षों की अवधि तक सेवा की हो या
2. राष्ट्रीय कैडेट कोर का 'बी' प्रमाण पत्र प्राप्त किया हो।

आयु सीमा: 01.08.2007 को 35 वर्ष से अधिक नहीं।

आयुसीमा में छूट- उत्तर प्रदेश के अन्य पिछड़ा वर्ग के अभ्यर्थियों हेतु आयुसीमा में 5 वर्ष तक की छूट अनुमन्य होगी। उ०प्र० जल निगम में कार्यरत कर्मचारियों द्वारा उ०प्र० जल निगम में की गई सेवा अवधि की 5 वर्ष तक आयु सीमा में छूट अनुमन्य होगी। उत्तर प्रदेश जल निगम में अप्रैन्टिस एक्ट 1961 के अन्तर्गत प्रशिक्षण प्राप्त अभ्यर्थियों के लिए आयु सीमा में अधिकतम एक वर्ष की छूट प्रदान की जाएगी।

चयन प्रक्रिया- यह दो चरणों में होगी- लिखित परीक्षा तथा साक्षात्कार।

लिखित परीक्षा कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर-228118 द्वारा लखनऊ के विभिन्न केन्द्रों पर आयोजित की जायेगी, तथा साक्षात्कार उत्तर प्रदेश जल निगम द्वारा लखनऊ में प्रधान कार्यालय 6, राणा

प्रताप मार्ग लखनऊ पर किया जायेगा। लिखित परीक्षा से निर्मित श्रेष्ठतासूची के आधार पर ही साक्षात्कार हेतु बुलाया जायेगा। विज्ञापित पदों पर चयन लिखित परीक्षा तथा साक्षात्कार में प्राप्त कुल अंकों के आधार पर तैयार श्रेष्ठता सूची (मेरिट) के अनुसार ही किया जायेगा।

आवेदन पत्र प्राप्त करने की अन्तिम तिथि: 01.02.2010

परीक्षा की तिथि- 07.03.2010

आवेदन पत्र: आवेदन पत्र, लिखित परीक्षा का पाठ्य क्रम एवं अन्य विवरण अभ्यर्थी उत्तर प्रदेश जल निगम की वेब साइट www.upjn.org एवं कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर की वेब साइट www.knit.ac.in पर उपलब्ध होगी। अभ्यर्थी अपने आवेदन पत्र कमला नेहरू प्रौद्योगिकी संस्थान सुलतानपुर के कार्यालय से भी प्राप्त कर सकते हैं। अभ्यर्थी द्वारा निर्धारित प्रारूप पर भरे हुए आवेदन पत्र निर्धारित भुक्त रू० 500/के बैंक ड्राफ्ट जो अधि ग्रासी अभियन्ता (कै 1), उत्तर प्रदेश जल निगम, लखनऊ के पक्ष में देय हो, समन्यवक (लिखित परीक्षा), कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर को दिनांक 01.02.2010 की सांय 5 बजे तक पंजीकृत डाक/स्पीड पोस्ट से अव य प्राप्त हो जानी चाहिए। अभ्यर्थी अपने आवेदन पत्र कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर के कार्यालय में सीधे भी जमा कर सकते हैं। विलम्ब से प्राप्त होने वाले अथवा अपूर्ण/त्रुटिपूर्ण आवेदन पत्रों या उत्तर प्रदेश जल निगम के कार्यालय में भेजे गये आवेदन पत्रों पर विचार नहीं किया जाएगा।

आव यक निर्दे 1-

1. अभ्यर्थी भारत का नागरिक हो किन्तु उत्तर प्रदेश का " डोमीसाइल" हो एवं उत्तर प्रदेश में घोषित अन्य पिछड़ी जाति की सूची में सम्मिलित हो तथा सक्षम स्तर से प्रमाण पत्र प्राप्त हो।
2. जो अभ्यर्थी सरकारी विभाग/निगम में कार्यरत है, वह उचित माध्यम द्वारा ही आवेदन करें। अभ्यर्थी को नियुक्ति के पूर्व अपने पैतृक विभाग से अनापत्ति प्रमाण पत्र देना अनिवार्य होगा।
3. नियुक्ति अधिकारी के पास यह अधिकार सुरक्षित होगा कि वह बिना कारण बताये प्राप्त आवेदन पत्रों में से किसी एक अथवा सभी को निरस्त कर दे।
4. अभ्यर्थी आवेदन पत्र एवं अन्य विवरण सीधे समन्यवक, कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर-228118 से अधि ग्रासी अभियन्ता (कै 1), उत्तर प्रदेश जल निगम लखनऊ के पक्ष में, लखनऊ में देय रू. 500.00 के बैंक ड्राफ्ट प्रस्तुत करने पर दिनांक 31.12.2009 से सभी कार्य दिवसों में प्राप्त कर सकते हैं अथवा उपर्युक्त वेबसाइट से डाउनलोड कर सकते हैं।
5. अभ्यर्थी द्वारा भरे हुये निर्धारित आवेदन पत्र समन्यवक, जल निगम परीक्षा, कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर-228118 को दिनांक 01.02.2010 सांय पाँच बजे तक केवल पंजीकृत डाक/स्पीड पोस्ट के माध्यम से प्राप्त हो जाने चाहियें। आवेदन पत्र व्यक्तिगत रूप से कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर कार्यालय में निर्धारित अवधि के भीतर जमा किये जा सकते हैं। यदि डाक द्वारा आवेदन पत्र आने में विलम्ब होता है तो इसके लिए कार्यालय उत्तरदायी नहीं होगा। अन्तिम तिथि के बाद प्राप्त होने वाले तथा अपूर्ण/त्रुटिपूर्ण आवेदन पत्रों पर विचार नहीं किया जायेगा।
6. आवेदन पत्र लिफाफे के ऊपर मोटे अक्षरों में " उत्तर प्रदेश जल निगम में सहायक अभियन्ता (वि. /यॉ.) के पद पर भर्ती हेतु आवेदन" अव य लिखा जाये।
7. आवेदन पत्र में स्वप्रमाणित दो फोटो चस्पा करना व आवेदन पत्र के साथ भौक्षिक योग्यता का प्रमाण पत्र, जन्म तिथि प्रमाण पत्र, आरक्षित वर्ग के लिए सक्षम अधिकारी द्वारा निर्गत प्रमाण पत्र, अनुभव प्रमाण पत्र, यदि कोई हो, की प्रमाणित प्रतियाँ संलग्न करना अनिवार्य है।
8. आवेदन पत्र के साथ पत्राचार का पता लिखे हुये लिफाफे (10 x 23 सेंटीमीटर) जिसपर निर्धारित पंजीकृत डाक टिकट (रू. 30.00) लगा हो, संलग्न करें।
9. लिखित परीक्षा/साक्षात्कार एवं चयन के सम्बन्ध में चयन समिति का निर्णय अन्तिम होगा।
10. लिखित परीक्षा/साक्षात्कार के लिए कोई यात्रा भत्ता देय नहीं होगा।

11. विज्ञापन में किसी प्रकार की प्रकाशन त्रुटि के लिए कार्यालय उत्तरदायी नहीं होगा। विभाग का मूल विज्ञापन ही मान्य होगा।
12. ऐसे अभ्यर्थी अपात्र होंगे, जिसके एक से अधिक पत्नी/पति जीवित हों।
13. आवेदन पत्र, लिखित परीक्षा का पाठ्यक्रम एवं अन्य विवरण अभ्यर्थी उ0प्र0 जल निगम की वेब साइट www.upjn.org एवं कमला नेहरू प्रौद्योगिकी संस्थान, सुलतानपुर की वेबसाइट www.knit.ac.in से डाउनलोड कर सकते हैं।
14. उपरोक्त विशेष भर्ती अभियान के अन्तर्गत बैकलाग को पूर्ण करने हेतु समस्त विधिक विवादों की जिम्मेदारी पूर्णतया उत्तर प्रदेश जल निगम लखनऊ की होगी।



उत्तर प्रदेश जल निगम

6. राणा प्रताप मार्ग, लखनऊ

(Conducted by Kamla Nehru Institute of Technology, Sultanpur (UP) 228118)

Advertisement No: J.N/KNIT/AE/01

Last date of submitting the application **01.02.2010**

Post Applied for:

Roll No.:

Application fees: Amount----- Name of the Bank: ----- Draft No. & date:-----

1. Name of the Applicant:

(a) In English (Capital Letters): -----

(b) In Hindi (Devnagari) :-----

Passport Size
Photograph
duly attested
by Gazetted
Officer

2. Father's/Husband's Name:-----

3. Date of Birth :-----

(As per High School / Higher secondary/certificate or its equivalent)

Age as on 01.08.2007 : -----years -----Months -----Days

4. Address for Correspondence:-----

Phone (Landline):----- Mobile:----- Email:-----

Permanent Address :-----

Phone:----- Mobile:-----

5. Sex Male / Female (Place a tick mark on the correct choice)

6. Nationality :-----

7. Whether you are a **dependent of any of the following (If yes, place a tick mark against the correct choice).**

(a) Freedom Fighter

(b) Ex-Service man

(c) Physically Handicapped

8 (a). Details of Academic/Technical Qualifications

S. No	Name of Examination	Passing Year	Name of college/Institution	Board/University	Max Marks	Marks obtained	Division	(%)
1	High School/ Equivalent							
2	Intermediate/ Equivalent							
3	B.E/B.Tech./ Equivalent							
4	M.E./M.Tech./ Equivalent							

8(b). Extra- Education Qualification:

- (i) Whether served in territorial army for at least two years (Yes / No)
- (ii) Whether hold a “B” or “C” certificate from National Cadet Corps (NCC)

9. Marital Status: Married / Unmarried

If married, number of living husband / wife

10. Enclose the attested copies of following:

- (i) Caste certificate (ii) Certificates in support of information given at point (3), (7), 8 (a) and (b)

(Impression of right hand thumb of the candidate)

(Signature of the candidate)

I/Km/Smt _____ son/daughter/wife _____
of Sri _____ hereby declare that the
information given above by me in this application form are correct and filled in
clearly at the right place. In future and at any time if any of the information is
found to be untrue or of ambiguous/doubtful nature, I shall have no objection
to my application form/appointment being cancelled as per the rule without
prior information/notice to me and I shall have no claims whatsoever on
account of such cancellation.

Place _____ Date _____
candidate)

(Signature of the

Signature of the forwarding authority with date and office seal
(For candidates serving in central government/state government/corporations)

Written Examination For the Post of assistant Engineer(E/M)

1. The written examination for Assistant engineer(E/M) will consist of a single paper containing THREE parts as per details below

Part	Subject	Duration	Maximum Marks
I	General Knowledge	30 mins.	50
II	Fundamentals of Engineering Sciences	60 mins.	100
III	A. Electrical Engineering OR B. Mechanical Engineering	90 mins.	150
TOTAL		3 Hours	300

For Part – III those candidates who have degree in Electrical Engineering will attempt Electrical Engineering part & Those candidates who have degree in Mechanical Engineering will attempt Mechanical Engineering part. Parts I & II is common to all.

2. The question paper will be of objective type.
3. The Total duration of the question paper will be THREE hours.
4. There will be negative marking for wrong answer.
5. Syllabus of written examination is as follows.

Syllabus:

PAPER-1

GENERAL KNOWLEDGE:

Questions on general knowledge will cover current affairs and general appreciation & understanding of science including matters of everyday observations and experience, as may be expected of a well-educated person who has not made a special study of any particular scientific discipline. In current events, knowledge of significant national and international events will be tested. In history of India, emphasis will be on broad general understanding of the subject in its social, economic and political aspects including Indian National Movement. In Geography, emphasis will be on geography of India including the main features of Indian agricultural and natural resources. Questions on Indian Politics and Economy will test knowledge of the country's political system and Constitution of India, Panchayati Raj, Social systems and economic development in India.

On general mental ability, the candidates will be tested on reasoning and analytical abilities.

The basic knowledge of computers and their applications will also be included in the general knowledge.

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PAPER-II FUNDAMENTAL OF ENGINEERING SCIENCES

1. Strength of Materials & Theory of Structures:

Analysis of stress & strain, principal stress & strain , maximum shearing stress. Mohr's circle representation of plane stress & strain. Stress-strain relations, elastic stress-strain relations, thermal strain, strain energy in an elastic body. Stress-strain relations for composite materials. Poisson's ratio, relations between various elastic constants, yield criteria. Torsion of circular and rectangular sections. Deflections due to bending, elastic stability of long & short columns. Euler's formula, instability as a mode of failure, Rankin's formula.

Classification of structures, static and kinematics indeterminacy. Analysis of pin jointed plane and space trusses. Analysis of determinate beams & plane frames, bending moment shear force and axial thrust diagrams and elastic curve. Rolling loads and influence lines for beams, trusses and arches. Analysis of fixed beams. Continuous beam and simple frames with and without translation of joints. Method of consistent deformation, slope-deflection method, moment distribution method, train energy method. Muller-Breslau's principle and its application for drawing influence lines for indeterminate beams. Analysis of determinate & indeterminate arches, linear arch. Energy theorems of deformable system. Unsymmetrical bending, location of neutral axis, computation of stresses & deflection, shear center for common structural sections. Matrix methods of analysis.

2. FLUID MECHANICS:

Incompressible Flow Through Pipes:

General viscous flow: Stokes viscosity law, Nerviier-stokes equations for laminar incompressible flow, two-dimensional laminar flow between parallel plates, laminar flow in circular pipes, apparent stresses, eddy viscosity.

Free Surface Flow: Uniform flow equations, best hydraulic section, specific energy, critical path, varied flow in rectangular channels. Gradually varied flow over long channels.

Rotodynamic Machines: Hydraulic turbines, efficiency, similarity laws and specific speed, cavitations, characteristics curve. Rotodynamic pumps, basic equations, axial and mixed flow pumps, cavitations in pumps and characteristics curve.

3. FUNDAMENTALS OF THERMODYNAMICS:

Introduction to S.I unit, density, sp-volume, pressure, reversible & irreversible process, work & heat , concept of ideal gas, characteristic equation of gas. Universal and characteristic gas constant. Enthalpy and specific heat deviation of real gas from ideal gas. Zeroth law concept of temperature, equality of temperature, principle of thermometry and temperature scale. First law of thermodynamics. Essence of second

law. COP of head pump and refrigerator Clausius inequality. Properties of steam, property diagram, Rankin cycle. Air standard cycles (Otto and Diesel cycles). Principle of working and description of two and four stroke SI and CI engines.

4. BASIC ELECTRICAL TECHNOLOGY:

Network theory; Thevenin, Norton, maximum power transfer theorems, Star delta transformation, Circuit theory Concepts, Mesh and Nodal analysis Star/delta connections, line and phase voltage/Current relations, three phase power and its measurement. Instruments for measuring voltage, current, power and energy; construction, principle and application. Magnetic circuit concept theory and working principles of single phase transformer. Basic concepts of rotating machines. Different types of DC machines and their characteristics & applications. Elementary idea of operation of synchronous and induction machines. Single phase induction & stepper motors and their applications.

5. BASIC ELECTRONICS:

Energy band theory of solids, concept of forbidden gap, insulators, metals and semiconductors. Mobility and conductivity, electrons and holes in an intrinsic semiconductor, donor and acceptor impurities, Fermi level, carrier densities in semiconductor, electrical properties of semiconductor, Hall effect, diffusion P-N junction, depletion layer, V-I characteristics, diode resistance capacitance switching time, diode application as a rectifier, diode circuits, breakdown mechanism, Zener & Avalanche breakdown characteristics, Bipolar, junction transistor. CE, CB and CC configuration, characteristics curves. Requirements of biasing, biasing types and biasing analysis, stability, Graphical analysis of CE, amplifier, concept of voltage gain, current gain and power gain, h-parameter, computation of A_v , R_i & R_o . Concepts of ideal op-amp, inverting, non-inverting and unity gain amplifiers, Number systems, conversion of bases. Boolean, Algebra, Logic gates, concept of universal gate.

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PAPER-III

A-ELECTRICAL ENGINEERING PAPER:

1. EM Theory:

Electric and magnetic fields. Gauss's Law and Amperes Law. Fields in dielectrics, conductors and magnetic materials. Maxwell's equations. Time varying fields. Plane-Wave propagating in dielectric and conducting media. Transmission lines.

2. Electrical Materials:

Band Theory, Conductors, Semi-conductors and Insulators. Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ferro and Ferri magnetism. Ceramics, Properties and applications. Hall effect and its Applications. Special semi conductors.

3. Electrical Circuits:

Circuits elements. Kirchoff's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Three-phase circuits. Two port networks. Elements of two-element network synthesis.

4. Measurements and Instrumentation:

Units and Standards. Error analysis, measurement of current, Voltage, power Power-factor and energy. Indicating instruments. Measurement of resistance, Inductance, Capacitance and frequency. Bridge measurements. Electronic measuring instruments. Digital Voltmeter and frequency counter. Transducers and their applications to the measurement of non-electrical quantities like, temperature, pressure, flow-rate displacement, acceleration, noise level etc. Data acquisition systems. A/D and D/A converters.

5. CONTROL SYSTEMS:

Mathematical modeling of physical systems. Block diagrams and signal flow graphs and their reduction. Time domain and frequency domain analysis of linear dynamical system. Errors for different type of inputs and stability criteria for feedback systems. Stability analysis using Routh-Hurwitz array, Nyquist plot and Bode plot. Root locus and Nicols chart and the estimation of gain and phase Margin. Basic concepts of compensator design. State variable matrix and its use in system modeling and design. Sampled data system and performance of such a system with the samples in the error channel. Stability of sampled data system Elements of non-linear control analysis. Control system components. electromechanical, hydraulic, pneumatic components.

6. Electrical Machines and Power Transformers:

Magnetic Circuits-Analysis and Design of Power transformers. Construction and Testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer 3-phase transformer. Parallel operation.

Basic concepts in rotating machines. EMF, torque, basic machine types, Construction and operation, leakage losses and efficiency. B.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Characteristics and performance analysis. Generators and motors. Starting and speed control. Testing, Losses and efficiency. Synchronous Machines. Construction. Circuit model. Operating characteristics and performance analysis. Synchronous reactance. Efficiency. Voltage. Regulation. Salient-pole machine, Parallel operation. Hunting Short circuit transients.

Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model Circle diagram. Starting and speed control. Fractional KW motors. Single-phase synchronous and induction motors.

7. Power systems:

Types of Power Stations, Hydro, Thermal and Nuclear Stations. Pumped storage plants. Economics and operating factors. Power transmission lines. Modeling and performance characteristics. Voltage control. Load flow studies, optimal power system operation. Load frequency control. Symmetrical short circuit analysis. Z-bus formulation. Symmetrical components. Per unit representation. Fault analysis. Transient and steady-state stability of power systems. Equal area criterion. Power system transients. Power system protection circuit breakers. Relays HVDC transmissions.

8. ANOLOG AND DIGITAL ELECTRONICS AND CIRCUITS:

Semiconductor device physics. PN junctions and transistors, circuit models and parameters. FET, Zener, tunnel, Schottky, photo diodes and their applications, rectifier circuits, voltage regulators and multipliers, switching behavior of diodes and transistors.

Small signal amplifiers, biasing circuits, frequency response and improvement multistage amplifiers and feed-back amplifiers, D.C. amplifiers, Oscillators Large signal amplifiers, coupling methods, push pull amplifiers, operational amplifiers. Wave shaping circuits. Multi-vibrators and flip-flops and their applications. Digital logic gate families, universal gates-combination circuits for arithmetic and logic operational, sequential logic circuits. Counters, registers. RAM and ROMs.

9. MICROPROCESSORS:

Microprocessor architecture-Instruction set and simple assembly language programming. Interfacing for memory and I/O, Applications of Micro-processors in power system.

10. COMMUNICATION SYSTEMS:

Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting Carrier communication. Frequency division and time division multiplexing. Telemetry system in power engineering.

11. POWER ELECRONICS:

Power Semiconductor devices. Thyristor. Power transistor, GTOs and MOSFETS. Characteristics and operation. AC to DC Converters. 1 phase and 3- phase DC to DC Converters. AC regulators. Thyristor controlled reactors, switched capacitor networks.

Inverters; single-phase and 3-phase. Pulse width modulation. Sinusoidal modulation with uniform sampling. Switched mode power supplies.

B. MECHANICAL ENGINEERING PAPER:

1. **Thermodynamics:** Cycles and IC Engines. Basic concepts. Open and closed systems. Heat and work. Zeroth, First and Second Law. Application to non-Flow and Flow processes. Entropy, Availability, Irreversibility and Tds relations. Claperyron and real gas equations. Properties of ideal gases and vapours. Standard vapor, Gas power and Refrigeration cycles. Two stage compressor C-I and S.I. Engines. Pre-

ignition, Detonation and Diesel-knock. Fuel injection and Carburation, Supercharging. Turbo-prop and Rocket engines. Engine Cooling, Emission & control, Flue gas analysis. Measurement of Calorific values, Conventional and Nuclear fuels. Elements of Nuclear power production.

2. Heat Transfer and Refrigeration and Air-conditioning: Modes of heat transfer. One dimensional steady and unsteady conduction. Composite slab and Equivalent Resistance. Heat dissipation from extended surfaces. Heat exchangers, Overall heat transfer coefficient. Empirical correlations for heat transfer in laminar and turbulent flows and for free and forced Convection. Thermal boundary layer over a flat plate. Fundamentals of diffusive and convective mass transfer. Black body and basic concepts in radiation. Enclosure theory, Shape factor, Net-work analysis. Heat pump and Refrigeration cycle and systems, Refrigerants. Condensers. Evaporators and Expansion devices.

Psychrometry, Charts and application to air conditioning, Sensible heating and cooling, Effective temperature comfort indices, Load calculations. Solar refrigeration, controls, Duct design.

3. Fluid Mechanics:

Properties and classification of fluids, Manometry, forces on immersed surfaces, center of pressure, Buoyancy, Elements of stability of floating bodies Kinematics and Dynamics.

Irrrotational and incompressible. Inviscid flow. Velocity potential. Pressure field and Forces on immersed bodies. Bernoulli's equation. Fully developed flow through pipes, Pressure drop calculations. Measurement of flow rate and pressure drop. Elements of boundary layer theory, Integral approach, Laminar and turbulent flows, Separations. Flow over weirs and notches. Open channel flow. Hydraulic jump. Dimensionless numbers. Dimensional analysis. Similitude and modeling. One-dimensional isentropic flow, Normal shock wave. Flow through convergent-divergent ducts. Oblique shock-wave. Rayleigh and Fanno lines.

4. Fluid Machinery and Steam Generators:

Performance, Operation and control of hydraulic Pump and impulse and reaction Turbines, Specific speed, Classification. Energy transfer, Coupling, Power transmission, Steam generators Fire-tube and water-tube boilers. Flow of steam through Nozzles and Diffusers, Wetness and condensation. Various types of steam and gas Turbines, Velocity diagrams. Partial admission. Reciprocating centrifugal and axial flow Compressors, Multistage compression, role of Mach Number, Reheat, Regeneration, Efficiency, Governance.

5. THEORY OF MACHINES:

Kinematics and dynamic analysis of planer mechanisms. Cams. Gears and gear trains. Flywheels. Governors. Balancing of rigid rotors and field balancing Balancing of single and multicylinder engines, Linear vibration analysis of mechanical systems. Critical speeds and whirling of shafts Automatic controls.

6. MACHINE DESIGN:

Design of joints: cotters, keys, splines, welded joints, threaded fasteners, joints formed by interference fits. Design of friction drives: couplings and clutches belt and chain drives, power screws.

Design of power transmission systems; gears and gear drives, shaft and axel wire rope.

Design of bearings: hydrodynamics bearings and rolling element bearings.

7. STRENGTH OF MATERIALS:

Stress and strain in two dimensions, Principal stresses and strains, mohr's construction, linear elastic materials, isotropy and anisotropy, stress-strain relations, uniaxial loading, thermal stresses. Beams: bending moment and shear force diagram, bending stresses and deflection of beams. Shear stress distribution. Torsion of shafts, helical springs. Combined stresses, thick and thin walled pressure vessels. Struts and columns. Strain energy concepts and theories of failure.

8. ENGINEERING MATERIALS:

Basic concepts on structure of solids. Crystalline materials. Defects in crystalline materials. Alloys and binary phase diagrams. Structure and properties of common engineering materials. Heat treatment of steels. Plastics. Ceramics and composite materials. Common applications of various materials.

9. PRODUCTION ENGINEERING:

Metal Forming: Basic Principles of forging, drawing and extrusion, High energy rate forming: Powder metallurgy.

Metal Casting: Die casting, investment casting. Shall Moulding, Centrifugal Casting, Gating & riser design; melting furnaces.

Fabrication Processes: Principles of Gas, Arc. Shielded arc Welding. Advanced Welding Processes, Weldability, Metallurgy of Welding.

Metal Cutting: Turning, methods of Screw Production, Drilling Boring Milling Gear Manufacturing, Production of flat surfaces. Grinding & Finishing Processes, Computer Controlled Manufacturing System-CNC, DNC, FMS, Automation and Robotics.

Cutting Tools Materials, tool Geometry, Mechanism of Tool Wear, Tool Life Machinability; Measurement of cutting forces Economics of Machining Unconventional Machining Processes. Jigs and Fixtures. Fits and tolerances Measurement of surface texture. Comparators Alignment tests and reconditioning of Machine Tools.

10. INDUSTRIAL ENGINNEERING:

Production Planning and Control: forecasting- Moving average, exponential smoothing, Operations, scheduling; assembly line balancing, Product development, Break-even analysis, Capacity planning, PERT and CPM.

Control Operations: Inventory control ABC analysis, EOQ model, Materials requirement planning. Job design, Job standards, Work measurement, Quality management-Quality analysis and Control. Operations Research: Linear Programming- Graphical and simplex methods, Transportation and assignment

models. Single server queueing model. Value Engineering; Value analysis for cost/value.

11. ELEMENTS OF COMPUTATION:

Computer Organisation, Flow charting, Features of Common computer Languages- FORTRAN, d Base III, Lotus 1-2-3, C and elementary Programmings.