Bachelor of Technology (Electrical Engineering)

Semester – V (w.e.f. session 2017-2018)

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<th>Course No.</th>
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<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
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Note: 1. * Subject Common with V Semester. B.Tech. [Electrical & Electronics Engg.] Scheme, K.U.K.
2. The students will have to undergo another six weeks Industrial Training after V sem and it will be evaluated during VII sem through submission of certified computerized report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.

Semester – VI (w.e.f. session 2017-2018)

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Note: 1. ** Subjects Common with VI Semester. B.Tech. [Electrical & Electronics Engg.] Scheme, K.U.K.
2. The students will have to undergo another six weeks Industrial Training after VI sem and it will be evaluated during VII sem through submission of certified computerized report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT-I

Power Diodes: depletion region, barrier potential, effect of forward & reverse bias, V-I characteristics, types of power diode, special features of power diode, power diode ratings, applications

Power Transistors: Introduction, Bipolar junction transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations, applications of power BJT.

UNIT-II

Thyristor, Construction, principal of operation, characteristics of Thyristor. Thyristor turn on methods gate control, trigger voltage, trigger current, turn on process, conduction, turn off process, turn on and turn off times. Thyristor specifications and ratings, methods to improve $di/dt$ and $dv/dt$ ratings, DIAC, TRIAC, UJT: Ratings, Construction, principle of operation. Characteristics & applications

UNIT-III

SCR Triggering Circuits: Resistance triggering, R-C triggering, UJT triggering, triac triggering, pulse transformer triggering. Thyristor in series, in parallel, snubber circuit.

SCR Commutation: methods, commutating circuits, protection.

Thyristor family RCT, GTO, LASCR, MCT, PUT, SUS, SBS, SCS

UNIT-IV

Convertors (Rectifiers): One, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms, output voltage equation, continuous and discontinuous modes of operation, input power factor of converter, reactive power demand effect of source inductance, introduction to four quadrant/dual converter, power factor improvement techniques, forced commutated converter, MOSFET and transistor based converters.

TEXT BOOKS/REFERENCES:

3. Power Electronics: PC Sen; TMH.
EE-303N Electronic Instrumentation & Measurement 4 1 25 75 100 3 Hr

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT - I


Instruments for Signals Generation: Square wave and pulse wave circuits, multi-vibrators, function Generators, frequency synthesizer.
Elementary idea of Bio-medical Measurement: ECG, EEG, Blood pressure measurement.

UNIT-II

Signal Conditioning & Acquisition System: Signal conditioning, DC & AC signal conditioning A/D converter, D/A converter, basic components of analog and digital data acquisition system.


Measurement of Displacement - Potentiometric resistance type transducers, inductive type transducers, differential transformer (L.V.D.T), capacitive transducers, Hall Effect devices, strain gauge transducers.

UNIT - III

Measurement of Velocity - Variable reluctance pick up, electromagnetic tachometers, photoelectric tachometer, toothed rotor tachometer generator.

Measurement of Flow: Venturi meter, electromagnetic flow meter.

Measurement of Pressure - Manometers, Force summing devices.

Measurement of Force - Strain-gauge load cells, pneumatic load cell, L.V.D.T. type force transducer.

UNIT - IV

Measurement of Torque - Torque meter, torsion meter, absorption dynamometers, inductive torque transducer and digital methods

Measurement of Temperature - Metallic resistance thermometers, semi-conductor resistance sensors(Thermistors), thermo-electric sensors, pyrometers.


Sound Measurement: Microphone, Types of Microphones.

Measurement of Humidity: Resistive, capacitive, aluminium oxide & crystal hygrometers.

Suggested Books:
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Unit I

Unit II

Unit III (Qualitative analysis only)

Unit IV (Qualitative analysis only)
HYBRID ENERGY SYSTEMS: Hybrid Systems and its types. Concept of Electric and Hybrid Electric Vehicles.

References:
7. Mukherjee D, Renewable energy Systems, New Age International, New Delhi, 2004
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I

UNIT II

UNIT III
Frequency Domain Analysis and Stability: Concept of stability, graphic and numeric techniques of stability analysis, Routh Hurwitz, Nyquist, Bode plot, Root locii and polar plots, frequency domain specifications and performance of LTI systems, Gain and phase margins, relative stability. Correlation with time domain performance closed loop frequency responses from open loop response. Limitations of frequency domain analysis.

UNIT IV

References:
3. Liner Control System by R.S. Chauhan, (Umesh Publications)
5. Control System by B.C. Kuo.
**Code** | **Nomenclature of Subject** | **L** | **T** | **Int.** | **Ext.** | **Total** | **Time**
---|---|---|---|---|---|---|---
EE-309N | Power Transmission & Distribution | 4 | 1 | 25 | 75 | 100 | 3 Hr

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT - I**

**Transmission of Power by A.C. & D.C. system:** Typical power system, Modern trends in power system transmission. Underground and overhead system, Effects of increase in Voltage on transmission line efficiency

**Distribution of Power:** General consideration, Radial and ring main system. Different types of distributors; Relative copper consumption in various systems. Conductor size and Kelvin's Law, Tariffs and power factor improvement.

**UNIT - II**

Resistance of transmission lines, skin effects, Proximity effect,

**Inductance** of a single phase & two phase line, Composite conductor lines, Three phase lines with symmetrical and unsymmetrical spacing, Bundled conductors

**Capacitance** of two-wire line, three phase line with symmetrical and unsymmetrical spacing, Effect of earth capacitance.

**UNIT - III**

**PERFORMANCE OF LINES** Short, medium and long lines – their representation, Performance calculation, determination of ABCD parameters, Ferranti effect, Surge impedance Loading of transmission lines,

**Corona loss & radio interference** Factors affecting corona, advantages and disadvantages of corona, disruptive critical voltage, visual critical voltage, corona power loss, methods of reducing corona effects, advantages & disadvantages of corona, interference of power lines with neighboring communication lines.

**UNIT IV**

**Underground cables,** Cables for A.C & D.C systems, Insulation resistance and capacitance, capacitance measurement, cable loss, Power factor in cable. Heating of cables Thermal characteristics, Use of inter sheaths, Capacitance grading.

**Mechanical Considerations** Types of Insulators, Methods of equalizing voltage distribution, Line supports, various types of conductor material, Sag calculations, Effect of wind, Ice and temperature on sag, Conditions at erection.

**Text Books/References:**
1. Power System analysis and Stability by S.S. Vadhera
2. Electrical Power System by C.L. Wadhwa
3. Electrical Power System by Ashfaq Hussain
4. Elements of Power System Analysis by W.D. Stevenson
5. Electric Power System by B.M. Weddy
6. The transmission and Distribution of Electric energy by H. Cotton
8. A Course in Electrical Power by Soni, Gupta and Bhatnagar
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<td>25</td>
<td>75</td>
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**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT – I**
Review of vector algebra, the three orthogonal co-ordinate systems and their inter-relation, review of vector calculus in all the three coordinate systems: Line, surface & volume integrals, gradient, divergence & curl of vector & their physical significance, Divergence theorem, stokes theorem, concept of soleniodal and irrotational fields.

Gauss Law in electrostatics & its applications, uniform line, surface & volume charge distributions, concept of electric field & electric potentials, electric field & potential due to a linear dipole, Spherical & cylindrical capacitor, energy density in electric field, method of images.

**UNIT- II**
Magnetostatics: Magnetic flux density and magnetizing field intensity, Biot Savart's law, Amperes circuital law & its applications. Magnetic vector potentials, Magnetic field energy, boundary conditions for both the electric & magnetic fields at the interface of various types of media. Laplace, Poisson's equation & continuity equation, displacement current density, conduction current density, Maxwell's equation in differential & integral forms, time harmonic cases & their physical significance, retarded potentials.

**UNIT- III**
UPW: Plane waves & uniform plane waves and their properties, wave equations in various media, Polarization & its types, intrinsic impedance, propagation constant, reflection & refraction of uniform plane waves at the interface of conductor- dielectric & dielectric-dielectric (both normal and oblique incidence). Relaxation time, skin effect, skin depth & surface impedance, Poynting vector theorem and its physical significance.

**UNIT- IV**
Transmission lines: Distributed parameters, circuit parameters, concepts of voltage & current flow on a transmission line, line equations, characteristics impedance. Reflection of transmission line, maxima & minima, standing wave ratio of a transmission line, impedance matching, Smith’s chart & its applications, co-axial type transmission line.

Wave Guides: Brief idea of Wave Guides, types of Wave Guides. TE, TM and TEM modes in rectangular wave guides.

**Reference Books:**
2. Electromagnetic Fields & Wave by Sadiku (Oxford Univ. Press)
3. Electromagnetic by J.D. Kraus, MGH.
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**LIST OF EXPERIMENTS:**

1. Experiment to study linear system simulator.
2. To study the stroboscope & measure the shaft speed
3. Experiment to study light intensity control using P & PI controller with provision for and transient speed control.
4. Experiment to study D.C motor speed control.
5. Experiment to study the stepper motor characteristics and its control through microprocessor kit.
6. Experiment to study Temperature control system.
7. Experiment to study Compensation design.
8. Experiment to study Digital control system.
9. Experiment to study synchros.
10. Experiment to study AC Position control system.
11. Experiment to study Potential Metric Error detector.

**NOTE:** 10 experiments are to be performed with at least 8 from above list; the remaining may either be performed or designed & set by concerned Institution as per the scope.


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**LIST OF EXPERIMENTS:**

1. Experiment to study characteristics of diode, Thyristor and Triac.
2. Experiment to study characteristics of Transistor and MOSFET.
3. Experiment to study R and R-C firing circuits.
4. Experiment to study UJT firing circuit.
5. Experiment to study complementary voltage commutation using a lamp flasher.
6. Experiment to study Thyristorised D.C circuit breaker.
7. Experiment to study Thyristorised A.C phase control.
8. Experiment to study full wave converter.
9. Experiment to study series inverter.
10. Experiment to study DC chopper.
11. Experiment to study of bridge inverter.
12. Experiment to study of single phase cycloconvertor.

**NOTE:** At least 10 experiments are to be performed with 8 from above list; the remaining may either be performed or designed & set by concerned Institution as per the scope.
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**LIST OF EXPERIMENTS:**

1. To Measure Temperature using RTD.
2. To Measure Displacement using L.V.D.T.
3. To Measure Load using Load Cell.
5. To Light intensity Measurement using LDR & Photo Cell.
6. To Measure Angular Displacement using Capacitive Transducer.
7. To Measure the Variation in Water Level using Capacitive Transducer.
8. Experiment to measure temperature coefficient of material using thermo couple.
9. Experiment to measure pressure using strain gauge.
10. Experiment to study Op-Amp as instrumentation amplifier.
11. Experiment to study Op-Amp as AD/DA converter.
12. Experiment to measure the speed of D.C motor using magnetic pick-up.
13. Experiment to measure the speed of D.C motor using Photo-electric pick-up.
14. To study Q-meter for measurement of resistance, inductance and capacitance.

**NOTE:** At least 10 experiments are to be performed with 8 from above list, the remaining may either be performed or designed & set by concerned Institution as per the scope.
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Unit -I

D.C. to D.C. Converter: Choppers
Classification of choppers, principle of operation, steady state analysis of class A choppers, step up chopper, steady state, switching mode regulator: buck, boost, buck-boost, cuk regulators, current commutated and voltage communicated chopper, basic scheme, output voltage control techniques, one, two and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

Unit-II

D.C. to A.C. Converter:
Classification, basic series and improved series inverter, parallel inverter, single phase voltage source inverter, steady state analysis, half bridge and full bridge inverter: modified Mc Murray and modified Mc Murray Bedford inverter, voltage control in single phase inverters, PWM inverters reduction of harmonics, current source, three phase bridge inverter.
Inverters:
Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray-Bedford half bridge and bridge inverters, brief description of parallel and series inverter (CSI), transistor and MOSFET based inverters

Unit-III

A.C. to A.C CONVERTER: Cycloconverter
Basic principles of frequency conversion, types of cycloconverters, non-circulating and circulating types of cycloconverters. Classification, principle of operation of step up and step down cycloconverter, single phase to single phase cycloconverter with resistive and inductive load. Three phase to three phase cycloconverter. Output voltage equation of cycloconverter.

Unit-IV

Applications of Power Electronics. (Brief descriptions):
Switched mode power supplies, AC Regulators , UPS ,static switches ,solid state relays, static circuit breakers A.C. Regulators, electric welding ,electric heating, battery charging, illumination control ,FACTs devices, zero voltage switch, over voltage protection, HVDC System

Text Books:
1. M.H. Rashid, Power Electronics: Circuits Devices and Application, PHI
4. M. Ramamoorthy an introduction to Thyristors & their applications East West Press.
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT-I
INTRODUCTION: Evaluation of microprocessors, technological trends in microprocessor development. The Intel family tree, CISC Versus RISC, Applications of Microprocessors.

8086 CPU ARCHITECTURE: 8086 Block diagram; description of data registers, address registers; pointer and index registers, PSW, Queue, BIU and EU. 8086 Pin diagram descriptions, Generating 8086 CLK and reset signals using 8284. WAIT state generation, microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module.

UNIT – II
8086 INSTRUCTION SET: Instruction formats, addressing modes, Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions; process control instructions; Assembler directives.

8086 PROGRAMMING TECHNIQUES: Writing assembly language programs for logical processing, arithmetic processing, timing delays; loops, data conversions, writing procedures: data tables, modular programming and macros.

UNIT – III
MAIN MEMORY SYSTEM DESIGN: Memory devices, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode. Address decoding techniques. Interfacing SRAMS; ROMS/PROMS. Interfacing and refreshing DRAMS. DRAM Controller – TMS4500.

UNIT – IV
BASIC I/O INTERFACE: Parallel and Serial I/O Port design and address decoding, Memory mapped I/O Vs Isolated I/O Intel's 8255 and 8251 – description and interfacing with 8086. ADCs and DACs, -types, operation and interfacing with 8086. Interfacing keywords, alphanumeric displays, multiplexed displays and high power devices with 8086.


Suggested Books:
2. J. Uffenbeck, The 8086/8088 family, PHI.
3. liu, Gibson, Microcomputer Systems- The 8086/8088 family, (2nd ed- PHI).
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT-I

**Introduction** Characteristics & representation of components of a power system, synchronous machines, transformers, lines cables & loads. Single line diagram of a power system Flow of zero sequence current, zero sequence impedance diagrams of power system with different types of connections of three phase transformers

**Neutral grounding** need for neutral grounding, various types of neutral grounding

Flow of zero sequence current, zero sequence impedance diagrams of power system with different types of connections of three phase transformers

UNIT-II

**Circuit Interruption**: Circuit interruption, theory of arc formation and it’s excitation in d.c., a.c. circuits, restricting & recovery voltage, interruption of capacitive & inductive currents. Rupturing capacity & rating of circuit breakers.


UNIT-III

**Symmetrical faults**: calculation of fault currents, use of current limiting reactors. **Unsymmetrical faults**: Types of transformation in power system analysis, symmetrical components transformation, sequence impedance of power system elements, Sequence network of power system analysis of unsymmetrical short faults, Network analysis & it’s application to interconnected system.

UNIT-IV

**Protective System** features of good protective system, elements of relay, terms connected with relay, time grading of over current protection, differential relay, distance or impedance relay, static relays (elementary idea)

Protection of alternators, transformer, bus-bar, lines

Reference Books:

1. Elements of Power System Analysis by W.D. Stevenson.
4. Power System & Protection by S.S. VADHERA
5. Electrical Power System by C.L. Wadhwa
6. Electrical Power System by Ashfaq, Hussain
7. Power System Protection & Switchgear, Ravinder Nath, New Age
8. Power System Protection & Switchgear, Badri Ram, MGH
9. Protection & Switchgear, Bhalja, Maheshwari, Oxford
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I

GENERAL: General features, limitations of electrical machine design, specific loadings thermal design types of enclosures, ventilation, heat dissipation, temperature rise, heating & cooling cycles, rating of machines, cooling media used, advantages of hydrogen cooling, effect of size and ventilation.

DC MACHINES: Main parts, Output equation, choice of specific loadings, choice of poles and speed, Design of core length, armature diameter, depth of armature core, air gap length, cross section of armature conductors, armature slots, design of field system field poles, field coils, commutater.

UNIT II

TRANSFORMERS: Main parts of transformer, Standard specifications, output equation, voltage per turn, optimum design, design of core, design of winding, simplified steps for transformer design, tank and Cooling tubes, Operating calculations circuit parameters, magnetizing current, losses and efficiency, Temperature rise and regulations from design data.

SYNCHRONOUS MACHINES: Types of construction, types of synchronous alternators Specifications, output equation, design of salient pole machines main dimensions, short circuit ratio, length of air gap, choice of armature slots, turns per phase, conductor section, design difference between turbo alternator & salient pole generators, direct & indirect cooling.

UNIT III

INDUCTION MOTORS:
Three Phase Induction Motor: Standard specifications, output equations, choice of specific loadings, main dimensions, conductor size and turns, no. of slots, slot design, stator core depth, rotor design, rotor bars & slots area, end rings.

SINGLE PHASE INDUCTION MOTOR: output equations, specific loadings, main dimensions, design of main and auxiliary winding, capacitor design, equivalent circuit parameters, torque, efficiency.

UNIT IV

COMPUTER AIDED DESIGN: Computerization of design procedures, development of computer programs & performance predictions, optimization techniques & their application to design problems.

TEXT BOOKS/REFERENCES:
6. CG Veinott, Theory and design of small induction machines, MGH, 1959
7. A Shanmugasundaram, Electrical machine design databook, John willey, 1979
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Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT-I

Introduction: Definition & classification of different type of electric drives, its Review characteristics, choice of electric drive ,components of electric drives, advantages and applications.

Dynamics of Electric drives & Rating of motors: - Fundamental load torque equation, types of loads, frequency operation of motor subjected to intermittent loads, pulse loads etc. Determination of motor rating, Heating/cooling curve, Nature of loads and classes of motor duty.

Control of Electrical Drives: Modes of operation, closed loop control of drives, sensing of current and speed.

UNIT-II

D.C. drives: Various methods of braking of D.C. drives, Speed control methods of D.C. drives, 1-Ø fully controlled and half controlled rectifier fed separately excited D.C. motor, 3-Ø fully and half controlled fed separately excited D.C. Motor, Performance and characteristics of 1-Ø and 3-Ø rectifier controlled D.C. drives.

UNIT-III


UNIT-IV


TEXT BOOKS:

REFERENCE BOOKS:
2. Electric Drives: V.Subrahmaniyam TMH
4. Electric Drives: Diwan
6. Electric Motor Drives by Krishnan,PHI
7. Electric Drives: S.K.Pillai,New Age
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I
Introduction: Basic elements of DSP system, Advantages and disadvantage of DSP over analog processing, Application of Digital signal processing.


UNIT II
FREQUENCY TRANSFORMATIONS
Introduction to DFT, Direct Computation of DFT, Properties of DFT, Circular Convolution, Fast fourier Transform (FFT), decimation in time, decimation in frequency algorithm, Use of FFT in Linear Filtering, Goetzel Algorithm, Chirp-Z Transform algorithm.

UNIT III

Design for Digital Filters: Symmetric and anti-symmetric FIR filters; Design of Linear Phase FIR using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency Sampling Method of FIR design, Impulse Invariance transformation, Bilinear transformation and its use in design of Butterworth and Chebyshev IIR Filters; Frequency transformation in Digital Domain, Matched Z-Transformation.

UNIT IV
Implementation of Discrete Time Systems:

DSP processor architecture fundamentals: Study of ADSP and TMS series of processor architectures.

References:
1. Digital Signal Processing by J.G. Proakis and D.G. Manalakis-PHI
5. Digital Signal Processing by Rabinar, Gold-PHI
6. Digital Signal Processing by S. Salivahanan- TMH
7. Digital Signal Processing by IFecher
LIST OF EXPERIMENTS / PROGRAMS:

1. Write a program in MATLAB to study the basic operation on the discrete time signals. (Amplitude and time manipulation).
2. Write a MATLAB program to perform discrete convolution (linear and circular) for a given two sequences.
3. Write a MATLAB program to perform the DFT for a given sequence.
4. Write a MATLAB program to compute DFT and IDFT for a given sequence using FFT algorithm.
5. Write a MATLAB program to perform sampling rate conversion for any given arbitrary sequence by interpolation, decimation, upsampling, downsampling and resampling.
6. Write a MATLAB program to find the time domain response (Impulse response and phase response ) for a given FIR and IIR systems.
7. Write a MATLAB program to find the frequency domain response (magnitude response and phase response ) for a given FIR and IIR systems.
8. Write a MATLAB program to design a low pass filler using window method for the given specification.
9. Write a MATLAB program to design Butterworth and Chebyshev low pass filler using bilinear transformation and Impulse Invariant Transformation.
LIST OF EXPERIMENTS

1. Experiment to find out the dielectric strength of transformer oil.
2. Experiment to find zero sequence component of three phase line.
3. Draw the characteristics of thermal overload relay.
4. Experiment to study an IDMT over current relay & plot it's characteristic curves i.e. graph between current & time.
5. Experiment to study differential relay characteristics.
6. Experiment to measure the ABCD parameters of a given transmission line, also study Ferranti effect.
7. Experiment to study Parallel operation of two alternators.
8. Experiment to plot the power angle characteristics of given transmission line.
9. Experiment to find the string efficiency of a string insulator with/without guard rings.
10. Experiment to study the characteristics of transmission line for t-network & π-network.
12. To study various types of distance relay.
13. Experiment to study fault current using sequence impedance network.

NOTE: At least 10 experiments are to be performed with at least 8 from above list, remaining 2 may either be performed from the above list or designed & set by concerned institution as per the scope.
Before starting with the experiments, teacher should make the students conversant with the following theoretical concept:

A.  
   i) Programming Modes of Intel’s 8086.  
   ii) Addressing Modes of Intel’s 8086.  
   iii) Instruction Formats of Intel’s 8086.
B.  Instruction Set of Intel’s 8086.
C.  Assembler and Debugger.

**LIST OF EXPERIMENTS**

I.  
   a) Familiarization with 8086 Trainer Kit.  
   b) Familiarization with Digital I/O, ADC and DAC Cards.  
   c) Familiarization with Turbo Assembler and Debugger S/Ws.  

II.  
    Write a program to arrange block of data in  
    a) Ascending and b) Descending order.  

III.  
    i) Program for finding largest number from an array.  
    ii) Program for finding smallest number from an array.  

IV.  
    Write a program to find out any power of a number such that  
    \[ Z = X^N \]  
    Where N is programmable and X is unsigned number.  

V.  
    Write a program to measure to generate:  
    (i) Sine Waveform  
    (ii) Ramp Waveform  
    (iii) Triangular Waveform using DAC Card.

VI.  
    Write a program to measure frequency/Time period of the following functions:  
    (i) Sine Waveform  
    (ii) Square Waveform  
    (iii) Triangular Waveform using DAC Card.  

VII.  
     Write a program to increase, decrease the speed of a stepper motor and reverse its direction of rotation using stepper motor controller card.  

VIII.  
     Write a programmable delay routine to cause a minimum delay = 2MS and a maximum delay = 20 minutes in the increments of 2MS.  

IX.  
    i) Use DOS interrupt to read keyboard string/character.  
    ii) Use BIOS interrupt to send a string/character to printer.  

X  
    Write a program to:  
    i) Create disk File  
    ii) Open, write to and close a disk file  
    iii) Open, Read from and close a disk file  
    iv) Reading data stamp of a file using BIOS interrupt

XI  
    i) Erasing UVPROMs and EPROM’s  
    ii) Reprogramming PROMs using computer compatible EPROM Programmer

XII  
    Studying and Using 8086 In-Circuit Emulator.

XIII  
    Write a Program to interface a two digit number using seven segment LEDs Using 8086 & 8255 PPI

**Note:** At least 10 experiments are to be performed, 8 from the above list, remaining experiments may be performed depending upon the scope.
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LIST OF EXPERIMENTS

1. Study of Industrial Applications of various mills.
2. Variable Torque Control of Induction Motor.
4. Rotor resistance control of 3 phases Slip Ring Induction Motor.
5. Chopper Control of DC Motor.
6. Chopper Control of separately excited DC motor.
7. Study of different types of a loading on a particular load.
   (a) Intermediate Loading
   (b) Continuous Loading
9. Variable Voltage Control of Induction Motor.
10. Microprocessor Based Control of any Motor.
11. To study direct torque control of DC motor in MATLAB.

**NOTE:** Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.
# Bachelor of Technology (Electrical & Electronics Engineering)

## V Semester (w.e.f. 2017-2018)

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**Grand Total**: 23 6 35 450 370 180 1000

2. **Industrial Training** undergone by the students after IV sem is to be evaluated during V sem as (EEN-319N) through submission of certified computerized report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.

## VI Semester (w.e.f. 2017-2018)

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**TOTAL**: 23 4 8 35 450 310 240 1000

**Note**: 1. ** Subjects Common with VI Semester. B.Tech. [Electrical Engg.] Scheme, K.U.K.
2. The students will have to undergo another six weeks Industrial Training after VI sem and it will be evaluated during VII sem through submission of certified computerized report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.
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**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**Unit – I: Power Quality Problems & Monitoring**
Overview and Definitions of power quality, sources of pollution, international power quality standards, and regulations.

**Unit – II: Power Quality Problems**
Surges, voltage sag and swell, over voltage under voltage, outage voltage, and phase angle imbalance, electric noise, harmonics, frequency deviation monitoring.

**Unit – III: Power System Harmonics**
Harmonic analysis, harmonic sources – the static converters, transformer magnetization and non-linear machines, are furnaces, fluorescent lighting. Harmonic effect within the power system, interference with communication harmonic measurements.

**Unit – IV:**
Design, measure to minimize the frequency and duration of outages in distribution systems voltage regulators, harmonic filters, power conditioners, uninterruptible power suppliers, emergency and stand by power systems, application of power conditioners. Power distribution systems design, measure to minimize voltage disturbances.

**Text Books:**

**Reference Books:**
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I
Introduction: Monolithic Silicon Fabrication Technology: Crystal Growth, Vapour phase (CVDT Technique) and molecular beam epitaxy. Dry and wet Etching.

UNIT II
Diffusion & Oxidation: Oxide properties, oxidation kinetics, Oxidation process, diffusion Fick's law, dopant sources, Diffusion mechanism, Constant source & limited source diffusion, Characterization of diffused layers, Introduction to ion implantation.

UNIT III
Lithography & Metallization: Choice of metals, Vacuum evaporation, Sputtering Metalization problems, Lithography: Introduction to Photo, X-ray, electron beam lithography process, various printing techniques.

UNIT IV
Planer Technology: Fabrication process, Sequence for a BJT, Capacitor, resistor, IC, Environment for IC fabrication,. Assembly & packaging techniques.

Introduction to MOS Technology: Basic MOS transistors, NMOS & CMOS fabrication.

MOS Inverters: Pass Transistor, NMOS Inverter, CMOS Inverter, Latch up in CMOS circuits.

References:
2  S.M. Sze: Micro Electronics.
3  Milliam Grabel : Mico Electronics
4  Pucknell : VLSI Design.
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I

Introduction: Characteristics of SCR, Diac, Triac and UJT. Protection of SCR against over voltage, over current, dv/dt, di/dt, Heat sink design, Methods of commutation of SCR’s, Series and Parallel operation of Thyristors.

UNIT II

AC to DC Converters: Classification of rectifiers, principle of working of each along with control circuits, Analysis of output voltage and current waveforms. Ripple factors, utility factor and efficiency, Effect of source and load inductance, Dual converter.

UNIT III

AC to AC Converters: Classification of Cycloconverters, principle of working along with control circuits, Analysis of output voltage and current waveforms, presence of sub-harmonic in cycloconverter output.

UNIT IV

DC to AC Converters: Classification of inverters, operation of each type, Analysis of voltage and current waveforms, current source inverter, voltage source inverter and pulse width modulated inverter.

DC to DC Converters: Classification of choppers, operating principle and control circuits for each type, Analysis of voltage and current waveforms.

References:

1. Thyristor Engineering by M.S. Brede.
2. Thyristor and their Application by M. Ramamurthy.
5. Line Commutated Thyristor Converter by Gotifriend, Moltgen.
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I

UNIT II
Time-Domain Analysis: Time domain analysis, transient response of first & second order systems, steady state error and static error constants in unity feedback control systems, response with P, PI and PID controllers, limitations of time domain analysis.

UNIT III
Frequency Domain Analysis and Stability: Concept of stability, graphic and numeric techniques of stability analysis, Routh Hurwitz, Nyquist, Bode plot, Root locii and polar plots, frequency domain specifications and performance of LTI systems, Gain and phase margins, relative stability. Correlation with time domain performance closed loop frequency responses from open loop response. Limitations of frequency domain analysis.

UNIT IV

References:
3. Liner Control System by R.S. Chauhan, (Umesh Publications)
5. Control System by B.C. Kuo.
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT - I
Transmission of Power by A.C. & D.C. system: Typical power system, Modern trends in power system transmission, Underground and overhead system, Effects of increase in Voltage on transmission line efficiency
Distribution of Power: General consideration, Radial and ring main system, Different types of distributors; Relative copper consumption in various systems. Conductor size and Kelvin's Law, Tariffs and power factor improvement.

UNIT - II
Resistance of transmission lines, skin effects, Proximity effect,
Inductance of a single phase & two phase line, Composite conductor lines, Three phase lines with symmetrical and unsymmetrical spacing, Bundled conductors
Capacitance of two-wire line, three phase line with symmetrical and unsymmetrical spacing, Effect of earth capacitance.

UNIT - III
PERFORMANCE OF LINES Short, medium and long lines – their representation, Performance calculation, determination of ABCD parameters, Ferranti effect, Surge impedance Loading of transmission lines, Calculation of synchronous phase modifier capacity.
Corona loss & radio interference Factors affecting corona, advantages and disadvantages of corona, disruptive critical voltage, visual critical voltage, corona power loss, methods of reducing corona effects, advantages & disadvantages of corona, interference of power lines with neighboring communication lines.

UNIT IV
Underground cables, Cables for A.C & D.C systems, Insulation resistance and capacitance, capacitance measurement, cable loss, Power factor in cable. Heating of cables Thermal characteristics, Use of inter sheaths, Capacitance grading.

Mechanical Considerations Types of Insulators, Methods of equalizing voltage distribution, Line supports, various types of conductor material, Sag calculations, Effect of wind, Ice and temperature on sag, Conditions at erection.

Text Books/References:
1. Power System analysis and Stability by S.S. Vadhera
2. Electrical Power System by C.L. Wadhwa
3. Electrical Power System by Ashfaq Hussain
4. Elements of Power System Analysis by W.D. Stevenson
5. Electric Power System by B.M. Weddy
6. The transmission and Distribution of Electric energy by H. Cotton
8. A Course in Electrical Power by Soni, Gupta and Bhatnagar
Nomenclature of Subject

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**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT – I**

Review of vector algebra, the three orthogonal co-ordinate systems and their inter-relation, review of vector calculus in all the three coordinate systems: Line, surface & volume integrals, gradient, divergence & curl of vector & their physical significance, Divergence theorem, stokes theorem, concept of solenoidal and irrotational fields.

Gauss Law in electrostatics & its applications, uniform line, surface & volume charge distributions, concept of electric field & electric potentials, electric field & potential due to a linear dipole, Spherical & cylindrical capacitor, energy density in electric field, method of images.

**UNIT-II**

Magnetostatics: Magnetic flux density and magnetizing field intensity, Biot Savart's law, Amperes circuital law & its applications. Magnetic vector potentials, Magnetic field energy, boundary conditions for both the electric & magnetic fields at the interface of various types of media. Laplace, Poisson's equation & continuity equation, displacement current density, conduction current density, Maxwell's equation in differential & integral forms, time harmonic cases & their physical significance, retarded potentials.

**UNIT- III**

UPW: Plane waves & uniform plane waves and their properties, wave equations in various media, Polarization & its types, intrinsic impedance, propagation constant, reflection & refraction of uniform plane waves at the interface of conductor- dielectric & dielectric-dielectric (both normal and oblique incidence). Relaxation time, skin effect, skin depth & surface impedance, Poynting vector theorem and its physical significance.

**UNIT- IV**

Transmission lines: Distributed parameters, circuit parameters, concepts of voltage & current flow on a transmission line, line equations, characteristics impedance. Reflection of transmission line, maxima & minima, standing wave ratio of a transmission line, impedance matching, Smith's chart & its applications, co-axial type transmission line.

Wave Guides: Brief idea of Wave Guides, types of Wave Guides. TE, TM and TEM modes in rectangular wave guides.

**Reference Books:**
2. Electromagnetic Fields & Wave by Sadiku (Oxford Univ. Press)
3. Electromagnetic by J.D. Kraus, MGH.
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LIST OF EXPERIMENTS:

1. Experiment to study linear system simulator.
2. To study the stroboscope & measure the shaft speed
2. Experiment to study light intensity control using P & PI controller with provision for and transient speed control.
3. Experiment to study D.C motor speed control.
4. Experiment to study the stepper motor characteristics and its control through microprocessor kit.
5. Experiment to study Temperature control system.
6. Experiment to study Compensation design.
7. Experiment to study Digital control system.
8. Experiment to study synchros.
10. Experiment to study AC Position control system.
11. Experiment to study Potential Metric Error detector.

NOTE: 10 experiments are to be performed with at least 8 from above list; the remaining may either be performed or designed & set by concerned Institution as per the scope.
LIST OF EXPERIMENTS

1. Study of VHDL.
2. To design the two input NAND gate, NOR gate, EX-OR gate in VHDL.
3. To design a full adder & full subtractor using the same hardware & with the help of control signal.
4. To design a 4:1 multiplexer and 1:4 demultiplexer in VHDL.
5. To design a priority encoder in VHDL.
6. To design a carry look ahead adder in VHDL.
7. To design a BCD adder & BCD subtractor in VHDL.
8. Write a program in VHDL to compute 2’s complement of a four bit binary numbers.
9. Write a program in VHDL to implement the Boolean expression $F = (A + B)(C + D)$ using CMOS circuitry.
10. Implement a $F = (A + B)$ using only PMOS circuitry.
   (i) Design a MOD-6 synchronous & asynchronous (ripple) counter in VHDL.
   (ii) Design a MOD-8 ring & Johnson counter in VHDL.
11. How to Install the VHDL on Computers for VLSI programs

**NOTE:** Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.
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LIST OF EXPERIMENTS

1. To plot the firing characteristics of given silicon control rectifier.
   (A) By varying the gate current $I_g$ keeping forward voltage $V_{ak}$ fixed.
   (B) By varying forward voltage $V_{ak}$ keeping gate current fixed
2. To study the V-I characteristics of given UJT (2n2646)
   To plot graph between $V_e$ and $I_e$ to find negative resistance region from the graph.
3. To plot V-I characteristics of given Triac in I and III quadrant.
4. To plot the drain characteristics of given FET & to evaluate the parameter $R_D$, $I_{DSS}$.
5. To study the UJT based relaxation Oscillator and to evaluate the dynamic resistance.
6. To study and draw the characteristics of DC-DC Chopper power circuit.
7. To study the characteristics of Single Phase fully controlled converter circuit.
8. To study the characteristics of 3-Phase Fully controlled power circuit.
9. To study Single Phase Cycloconverter circuit.
10. To study 3-Phase half wave rectifier using MAT LAB.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I

Introduction: Characteristics & representation of components of a power system, synchronous machines, transformers, lines cables & loads. Single line diagram.

Protective Relaying: Scheme of protection of generators, transformers, transmission lines & bus-bars, carrier current protection.

UNIT II


UNIT III

Fault Analysis:-

Symmetrical faults: Calculation of fault currents, use of current limiting reactors.

Unsymmetrical faults: Types of transformation in power system analysis, symmetrical components transformation.

Grounding: Need of neutral grounding, various types of neutral grounding technique, equipment earthing for safety.

UNIT IV

Transients in Power Systems: Transient electric phenomenon, travelling waves, reflection & refraction of waves with different line termination.


References:

1. Elements of power system analysis by W.D. Stevenson.
5. A course in Electrical Power by Soni, Gupta & Bhatnagar.
6. Power System Analysis & Stability by S.S. Vadhera
<table>
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<td>Data Communication &amp; Networking</td>
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<td>25</td>
<td>75</td>
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**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT I:** Basic & Computer Networks, Need & Evolution of Computer Networks, Description of LAN, MAN, WAN and wireless Networks, OSI and TCP/IP models with description of Data Encapsulation & peer to peer communication, Comparison of OSI and TCP/IP, Basic terminology of computer networks- bandwidth, Physical and logical topologies, LAN & WAN devices- Router, bridge Ethernet switch HUB, Modern CSU/DSU etc.

**UNIT II:** Physical Layer- Representation, Optical Network and wireless N/W, Encoding/Modulation- TTL Encoding, Manchester Encoding, AM, FM and PM, Dispersion, Jitter, Latency and collision. Different types of Media- Shielded twisted pair, Unshielded twisted pair, Coaxial cable, Optical Fiber cable and wireless. Layer- LLC and MAC sub layer, MAC addressing Layer 2 devices, Framing Error control and flow control. Error detection and correction CRC Codes, block parity and Checksum, elementary data link protocol, sliding window protocol, Channel allocation problem- static and dynamic.

**UNIT III:** Multiple Alex protocol- ALOHA, CSMA/CU Token bus Tokening, FDDI. Network Layer, Segmentation and autonomous system path determination, Network Layer addressing, Network-layer data gram, IP addressed classes, Subnetting, Sub network, Subnet mark, Routing algorithm- optimality Principle, Shortest path routing, Hierarchical routing, Broadcast routing, Multicast routing.

**UNIT IV:** Transport Layer- Layer 4 Protocol TCP & UDP Three way hand shakes open connection ATM AAL Layer protocol, Session Layer design issue, Presentation Layer design issue and Application layer design issue. Application layer Protocol, TELNET, FTP, HTTP, SNMP.

**References:**

1. Tannenbum, "Computer Networks," PHI
2. Darlx, "Computer Networks and Their Protocols", DLA Labs
3. Freer, "Comp. Communication & Networks", East-West-Pre
4. Frozen, "Data Communication & Networking (TMH)
5. Stalling, "Data & Computer Communication (PHI)"
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I

Introduction to microprocessor, architecture of 8085, description of 8085 pins, flags, registers, Demultiplexing the bus AD7–AD0, instruction cycle, machine cycle, T-state, fetch cycle and execute cycle; timing diagram; addressing mode; interrupts.

UNIT II

Instruction set: Data transfer group instruction, arithmetic group, logical group, machine group, branch group instructions, stack operation; sub routine.

Data Transfer Techniques: Memory mapped I/O & input/output mapped I/O space, program data transfer techniques, interrupt data transfer techniques, DMA.

UNIT III

Assembly language programming & interfacing: introduction of machine language; assembly language, high level language, example of assembly language programming; interfacing of the memory (RAM, ROM, EPROM, EEPROM), input device and output device;

Special purpose support devices: Brief description of 8255 PPI, 8253, 8251 USART

UNIT IV

Advanced 8086 microprocessor & microcontroller: 8086 microprocessor, its architecture, operating mode, pin description for minimum mode, pin description for maximum mode, comparison of 8086 & 8085.

Microcontroller: introduction of 8051 microcontroller & its block diagram, comparison of microprocessor and microcontroller

References:

1. R.S. GAONKAR: Microprocessor architecture, programming & Application. (MGH)
2. Malvino, A.P.: Digital computer electronics-an Introduction to microprocessor. (MGH)
3. D.V.HALL: Microprocessor & Digital circuits. (MGH)
4. MATHUR A.P.: Introduction to microprocessor
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I

GENERAL: General features, limitations of electrical machine design, specific loadings thermal design types of enclosures, ventilation, heat dissipation, temperature rise, heating & cooling cycles, rating of machines, cooling media used, advantages of hydrogen cooling, effect of size and ventilation.

DC MACHINES: Main parts, Output equation, choice of specific loadings, choice of poles and speed, Design of core length, armature diameter, depth of armature core, air gap length, cross section of armature conductors, armature slots, design of field system field poles, field coils, commutator.

UNIT II

TRANSFORMERS: Main parts of transformer, Standard specifications, output equation, voltage per turn, optimum design, design of core, design of winding, simplified steps for transformer design, tank and Cooling tubes, Operating calculations circuit parameters, magnetizing current, losses and efficiency, Temperature rise and regulations from design data.

SYNCHRONOUS MACHINES: Types of construction, types of synchronous alternators Specifications, output equation, design of salient pole machines main dimensions, short circuit ratio, length of air gap, choice of armature slots, turns per phase, conductor section, design difference between turbo alternator & salient pole generators, direct & indirect cooling.

UNIT III

INDUCTION MOTORS:
Three Phase Induction Motor: Standard specifications, output equations, choice of specific loadings, main dimensions, conductor size and turns, no. of slots, slot design, stator core depth, rotor design, rotor bars, slots area, end rings.

SINGLE PHASE INDUCTION MOTOR: output equations, specific loadings, main dimensions, design of main and auxiliary winding, capacitor design, equivalent circuit parameters, torque, efficiency.

UNIT IV

COMPUTER AIDED DESIGN: Computerization of design procedures, development of computer programs & performance predictions, optimization techniques & their application to design problems.

TEXTBOOKS/REFERENCES:

6. CG Veinott, Theory and design of small induction machines, MGH, 1959
7. A Shanmugasundarem, Electrical machine design databook, John Willey, 1979
**Code** | **Nomenclature of Subject** | **L** | **T** | **Int.** | **Ext.** | **Total** | **Time**
---|---|---|---|---|---|---|---
EE-310N | Electric Drives & Traction | 4 | 0 | 25 | 75 | 100 | 3 Hr

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**

**Introduction:** Definition & classification of different type of electric drives, its Review characteristics, choice of electric drive, components of electric drives, advantages and applications.

**Dynamics of Electric drives & Rating of motors:** - Fundamental load torque equation, types of loads, frequency operation of motor subjected to intermittent loads, pulse loads etc. Determination of motor rating, Heating/cooling curve, Nature of loads and classes of motor duty.

**Control of Electrical Drives:** Modes of operation, closed loop control of drives, sensing of current and speed.

**UNIT-II**

**D.C. drives:** Various methods of braking of D.C. drives, Speed control methods of D.C. drives, 1-Ø fully controlled and half controlled rectifier fed separately excited D.C. motor, 3-Ø fully and half controlled fed separately excited D.C. Motor, Performance and characteristics of 1-Ø and 3-Ø rectifier controlled D.C. drives.

**UNIT-III**

**AC Drives:** Various methods of braking of A.C. drives, Speed control methods of A.C. drives, Basic principle of induction motor drives, 3-Ø A.C. Voltage controller fed I.M drive, Drives using chopper, multi quadrant control of chopper fed motors, Synchronous motor Drives, Automatic starting and pulling operation of synchronous motors

**UNIT-IV**


**TEXT BOOKS:**

**REFERENCE BOOKS:**
2. Electric Drives: V.Subrahmaniyam TMH
4. Electric Drives: Diwan
6. Electric Motor Drives by Krishnan,PHI
7. Electric Drives: S.K.Pillai,New Age
Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT I

Introduction: Basic elements of DSP system, Advantages and disadvantage of DSP over analog processing, Application of Digital signal processing.


UNIT II

FREQUENCY TRANSFORMATIONS

Introduction to DFT, Direct Computation of DFT ,Properties of DFT, Circular Convolution , Fast fourier Transform(FFT),decimation in time ,decimation in frequency algorithm, Use of FFT in Linear Filtering , Goetzel Algorithm, Chirp-Z Transform algorithm.

UNIT III


Design for Digital Filters:- Symmetric and anti-symmetric FIR filters; Design of Linear Phase FIR using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency Sampling Method of FIR design, Impulse Invariance transformation, Bilinear transformation and its use in design of Butterworth and Chebyshev IIR Filters; Frequency transformation in Digital Domain, Matched Z-Transformation.

UNIT IV


DSP processor architecture fundamentals: Study of ADSP and TMS series of processor architectures.

References:

1. Digital Signal Processing by J.G. Proakis and D.G. Manalakis-PHI
5. Digital Signal Processing by Rabinar, Gold-PHI
6. Digital Signal Processing by S. Salivahanan- TMH
7. Digital Signal Processing by IFecher
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LIST OF EXPERIMENTS / PROGRAMS:

1. Write a program in MATLAB to study the basic operation on the discrete time signals. (Amplitude and time manipulation).
2. Write a MATLAB program to perform discrete convolution (linear and circular) for a given two sequences.
3. Write a MATLAB program to perform the DFT for a given sequence.
4. Write a MATLAB program to compute DFT and IDFT for a given sequence using FFT algorithm.
5. Write a MATLAB program to perform sampling rate conversion for any given arbitrary sequence by interpolation, decimation, upsampling, downsampling and resampling.
6. Write a MATLAB program to find the time domain response (Impulse response and phase response) for a given FIR and IIR systems.
7. Write a MATLAB program to find the frequency domain response (magnitude response and phase response) for a given FIR and IIR systems.
8. Write a MATLAB program to design a low pass filter using window method for the given specification.
9. Write a MATLAB program to design Butterworth and Chebyshev low pass filter using bilinear transformation and Impulse Invariant Transformation.
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<td>40</td>
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**LIST OF EXPERIMENTS:**

1. To study the 8085-microprocessor kit.
2. Add two Binary numbers using 8085-Microprocessor kit.
3. Find 2’s complement of a binary number using 8085-Microprocessor kit.
4. To arrange a series of numbers in descending order using 8085-Microprocessor kit.
5. Multiplication of two binary numbers using 8085-Microprocessor kit.
6. Divide a 16-bit number by 8-bit number and restore result in memory location 2700 using 8085-Microprocessor kit.
7. To find Square root of a 8-bit number using 8085-Microprocessor kit.
8. To find the largest number in a data array using 8085-Microprocessor kit.
9. To interface a D/A converter with the 8085-microprocessor kit.
10. To interface the stepper motor with the 8085-microprocessor kit.
LIST OF EXPERIMENTS:

1. To find out the dielectric strength of transformer oil.

2. To find zero sequence component of three phase line.

3. To draw the characteristics of thermal overload relay.

4. To study an IDMT over current relay to obtain and plot its characteristic curves i.e. the graph between current and time.

5. To measure the ABCD parameters of a given transmission line.

6. To plot the power angle characteristics of given transmission lines.

7. To find the string efficiency of a string insulator with/without guard rings.

8. To study the characteristics of transmission line for t-network & pie-network.

9. To study and testing of a current transformer.

10. To study various types of distance relays.
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<td>40</td>
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**LIST OF EXPERIMENTS-**

1. Study of Industrial Applications of various mills.
2. Variable Torque Control of Induction Motor.
4. Rotor resistance control of 3 phases Slip Ring Induction Motor.
5. Chopper Control of DC Motor.
6. Chopper Control of separately excited DC motor.
7. Study of different types of a loading on a particular load.
   (a) Intermediate Loading
   (b) Continuous Loading
9. Variable Voltage Control of Induction Motor.
10. Microprocessor Based Control of any Motor.
11. To study direct torque control of DC motor in MATLAB.

**NOTE:** Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.
## Bachelor of Technology (Textile Technology)

### Semester – V (w.e.f. 2017-18)

<table>
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<th>Allotment of Marks</th>
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<td>Structure and Properties of Fibres</td>
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**Total**

**S N** | **Course No.** | **Course Title**                        | **Teaching Schedule (hrs)** | **Allotment of Marks** | **Duration of Exam (hrs)** |
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**Note:** The students will have to undergo another six weeks Industrial Training after VI sem and it will be evaluated during VII sem through submission of certified computerized report to the Head of the Department followed by viva-voce, seminar/presentation.
TT-301N
STRUCTURE AND PROPERTIES OF FIBRES

L T P Sessional: 25 Marks
4 1 - Exam: 75 Marks

Total: 100 Marks
Time: 3 Hrs.

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I
Structure of fibres
Morphology and order in fibre structure, concept and theories of orientation, crystallization and its measurement technique such as X-ray.
Chemical and physical structure of fibres such as wool, silk, cotton and bast fibre and man-made fibre such as Nylon, PET, Acrylic and Viscose.

UNIT-II
Mechanical properties
Theory of load-elongation curve, stress-strain curve, modulus, elasticity and visco elasticity, work of rupture/toughness, yield point, creep and stress relaxation behavior of fibres and simple spring and dash pot models simulating textile fibers.
Frictional properties of fibers
Nature and measurements.

UNIT-III
Moisture properties
Relation between moisture regain and relative humidity, hysteresis, absorption in fibers, diffusion theories of moisture absorption-general view, diffusion of moisture, quantitatative analysis of moisture absorption, swelling.
Optical properties of fibers
Refractive index and polarization of light, birefringence and its measurement.

UNIT-IV
Thermal properties
Molecular motion and transition phenomenon, thermal expansion behaviour, first order and second order transition phenomenon.
Electrical properties
Introduction to electrical properties such as dielectric properties such as electric properties and static charge generation

Suggested Text Books and References
TT-303N
YARN MANUFACTURING-III

L T P   Sessional: 25 Marks
4 1 -   Exam: 75 Marks
       Total: 100 Marks
       Time: 3 hrs

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I
Forces acting on yarn and traveler during spinning, spinning tension in ring frame, Theory of yarn balloon, Limitations of ring spinning systems, modern developments in ring frame, Introduction to open-end spinning, Comparison of ring frame with other modern spinning technologies.

UNIT-II
Rotor Spinning: Principle of yarn formation, machine parameters, effect of machine variables and fibre properties on the rotor yarn property, raw material requirement and preparation, The opening unit.
Yarn formation: Fibre flow into the rotor, Formation of the yarn, the false twist effect, wrapping fibres. The Rotor groove, Rotor diameter, Combination of rotor dia, & rotor groove. Back doubling, Rotor revolutions, cleaning the rotor.
Yarn withdrawal and winding: The direction of withdrawal, the naval, Withdrawal tube, Requirement for the package, Economic aspects of rotor spinning, Structure and properties of different types of yarns, end uses of rotor yarns.

UNIT-III
Friction spinning: Operating principle, Technological interrelationship, Advantages & disadvantages Dref-2 process & DREF-3 process. Operating principle. Use of raw material, Study of electrostatic, air-vortex spinning, mechanism of yarn formation, properties and end uses of yarn spun on these systems.
The false-twist process: generation of false twist, Forming a yarn with the aid of false twist spinning elements.
Murata Jet spinner: operating principle, Raw material requirements, Yarn Characteristics and end uses.

UNIT-IV
Comparative analysis of yarn structure, properties and their end use application produced from rotor, air-jet, friction techniques viz a viz ring spun yarn.
Compact Spinning: principle, different methods of fibre compacting, properties of yarn. Production of fancy yarn & uses.
Production of Industrial yarn- Sewing thread.

Suggested Text Books and References
3. Oxtoby, E., Spun Yarn technology.
TT-305N
FABRIC MANUFACTURING-III

L  T  P  
4  1  -  

Sessional: 25 Marks  
Exam: 75 Marks  
Total: 100 Marks  
Time: 3 hrs

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

Unit I:

Unit II: 
Rapier Weaving Machine: Classification based on type of rapier, system of weft insertion and number of rapiers. Sequence of weft insertion for Gabler and Dewas system, their comparison. Driving of flexible and rigid rapiers. Asynchronized rapier timing. Rapier buckling. 

Unit III
Positive Let-off: Hunt’s let-off, electronic let-off. 
Positive Continuous Take-up: Sulzer take-up and Shirley take-up.

Unit IV

Suggested Text Books and References
2. Adanur, S. ”Weaving Technology”. 
3. Swaty,”Shuttleless Weaving”. 
4. Madhavamurthy,”Nonwoven”.
TT-307N  
FABRIC STRUCTURE & DESIGN

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT – I
Elements of Color:- Physical basis of color, light and color phenomenon, complementary colors and color measurements, attributes of primary and secondary color, color contrast and color harmony, application of color.

UNIT - II
Basic concepts of fabric structure, importance of fabric structure, classification of fabrics, notation of weave, weave repeat unit, drafting plan, construction of draft and lifting plans, peg plan and denting.

Simple Weaves
Plain weave and derivatives - basket, rib, repp
Twill weave and derivatives - zig-zag, herringbone, broken, steep, elongated; effect of twist on prominency of twill lines

Fabric set calculation
Yarn and cloth relationships-GSM Calculation

UNIT – III
Simple Weaves (contd.)
Sateen & Satins.
Crepe weaves, Mock-leno, Cork screw, Honey-comb, Huck-a-back, Bedford cord, Welt and pique fabrics, Extra warp and weft figuring

UNIT - IV
Backed Cloth, Double cloth, multi-layers fabric, belting structures, label weaving-narrow fabric, velvet and velveteen.

Suggested Text Books and References
TT – 309N
STATISTICAL ANALYSES

L T P Sessional: 25 Marks
4 1 - Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT -I
Foundations of statistics
Basic concepts of statistics, collection sampling, classification and graphical representation of data, Measures of central tendency. Numerical problems.
Sampling Theory
Population and sample, types of sampling, sampling classification and graphical representation of data, measures of central tendency, control charts.

UNIT -II
Measures of Dispersion Range, Quartile deviation, standard deviation, moments, skewness and kurtosis (Definition, properties and associated numerical only).
Theory of Probability
Different approaches to probability, Additive and Multiplicative Laws of probability, Baye’s theorem.

UNIT-III
Tests of hypothesis and significance
Definition of Statistical hypothesis, Null hypothesis. Type I and II errors and Levels of significance, Standard error and sampling distribution,
Tests of significance for large and small Samples (discussion). Problems based on χ²-test for goodness of fit, Student’s t-Test and Analysis of variance (one way and two way classifications).

UNIT-IV
Regression & correlation
Karl Pearson’s coefficient of correlation, Rank correlation coefficient and lines of regression, Numerical problems, factorial design and analysis.

Suggested Text Books and References

1. Ray and Sharma, “Mathematical Statistics”
TT-311N
YARN MANUFACTURING-III LAB

L T P Practical/viva: 60 marks
- - 3 Sessional: 40 marks
       Total: 100 marks
       Duration of Exam: 3 Hrs

LIST OF EXPERIMENTS
1. Study of operating principle, material flow and various parts of rotor spinning.
2. Study of drafting, twisting and winding operation of rotor spinning.
3. Study of operating principle, material flow and various parts of air jet spinning.
4. Study of drafting, twisting and winding operation of air jet spinning.
5. Study of operating principle, material flow and various parts of friction (Dref II and Dref III) spinning.
6. Study of drafting, twisting and winding operation of friction (Dref II and Dref III) spinning.
7. Study of Compact spinning, methods of fibre compacting, modification and attachments.
8. Assessment and control of variability in ring, rotor and air-jet spun yarns.

Note: 7 experiments from the above list are to be performed by each student. The above experiments should be conducted and shall be decided on factors like:
1. Facilities installed at the Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat/any other reputed establishments.
3. Trend of technological developments in National & International perspective.

TT-313N
FABRIC MANUFACTURING –III LAB

L T P Practical / Viva: 60 Marks
- - 3 Sessional: 40 Marks
       Total: 100 Marks
       Duration of exam: 3 Hrs.

LIST OF EXPERIMENTS
1. To study the different selvedge formation: Tuck-in, Leno, Fused and Knitted selvedge.
2. To study the working of positive let-off and electronic let-off and their advantages.
3. To study the working of Matched cam beat-up.
4. To study the working of Electronic Dobby and development of designs in electronic dobby.
5. To study the working of Flexible Rapier loom system and sequence of weft insertion.
6. To study the working of Rigid Rapier loom system and sequence of weft insertion.
7. Studies on Somet flexible rapier drive.
8. To study the working of torsion bar picking and sequence of weft insertion in projectile loom.
9. To study the working of Air jet nozzle and sequence of weft insertion in air jet weaving. Problems of Air jet loom.
10. To study the advantages and disadvantages of various shuttle less looms.

Note: 8 experiments from the above list are to be performed by each student. The above experiments should be conducted and shall be decided on factors like:
   a) Facilities installed at the Institute.
   b) Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat/any other reputed establishments.
   c) Trend of technological developments in National & International perspective.
LIST OF EXPERIMENTS

1. Basic principles of woven fabric analysis and estimation of data for cloth production.
2. Recognition of yarn and fabric and material used in their construction.

Weave analysis of:
4. Twill weave and its derivatives.
5. Satins and sateens.
7. Honey comb and brighten Honey comb.
8. Huck-a-back.
9. Crepe weaves
10. Diamond weave

Note: Any 8 experiments from the above list are to be performed by each student.
TT-302N
THEORY OF TEXTILE STRUCTURE

L T P Sessional: 25 Marks
3 1 - Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I
Yarn geometry: Coaxial helix model, idealized yarn geometry relationship of yarn number and twist factor. Twist contraction and retraction, ideal and real yarns. Packing of fibre in yarn. Ideal packing, hexagonal close packing and other forms. Deviation from ideal forms- concentrating and disturbing features, specific volume of yarns, relation between twist, diameter and twist angle.

UNIT-II
Introduction to fibre migration, Ideal migration, Mechanisms of migration- tension variation, geometric mechanism, combined mechanism, Tracer fibre technique, Parameters of migration, Migration in blended yarns.

UNIT-III

UNIT-IV

Suggested Text Books and References
UNIT-I
Fabric Testing
Importance of fabric testing, scope of fabric testing.
Methods of tests for fabric dimensions and other physical properties; thickness, weight, crimp, shrinkage, air permeability, moisture permeability, Water-vapour permeability, wettablility, shower-proofness, water-proofness and flame-resistance.
Aesthetic properties of fabric: drape, stiffness, bending, shearing, compression, crease recovery

UNIT-II
Fabric Tensile Testing
Fabric Strength Testing: Tensile, tearing and bursting strength tests; principles and operation of equipment, Fabric bending, shearing and draping properties: terminology, quantities and units. Experimental method.
Factors affecting the results of tensile testing. Evaluation and interpretation of tensile test results.

UNIT-III
Comfort and Handle
Objective assessment of fabric handle; KES and FAST system.

UNIT-IV
Testing of Technical Textiles
Testing of filtration characteristics, test for geotextiles, test for protective clothing, test of various form of medical textiles, moisture transmission through breathable fabrics, Special tests for carpets and nonwoven fabrics.
Mechanical behaviour of textiles. Terms and definitions, expressing the results, quantities and units.
Statistical Quality control in Textiles: tolerance limit, their setting, Control charts, Types of control charts – X-R chart, P chart, nP chart.

Suggested Text Books & References
2. Kothari, V.K., “Physical Testing of Textiles”
TT-306N
GARMENT TECHNOLOGY

L    T    P
3   1    -

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

Suggested Text Books and References
2. Emilio Pucu, "Fashion from Concept to Consumer".
UNIT-I
**Introduction to Knitting:** Difference between woven and knitted products and process. Classification of Knitting Machines. Terms and Definitions used in knitting. Elements of knitting: needles, sinker and cam.

UNIT -II

UNIT -III

UNIT -IV
Warp Knitting
Comparison between warp knits, weft knits and woven. Basic warp knit structures: over lap, under lap, closed lap, open lap. Knitting cycle in Tricot Knitting machine and Raschel knitting machine, Five Basic overlap, under lap variations, some warp knitted structures like, loop raised, satin, lock knit, two bar tricot, reverse lock nit, shark skin, queens cord, Open Atlas, Closed Atlas, etc.

Suggested Text Books and References
Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

Unit-I
Basic Concepts
Overview of CAD and CAM, their application in various fields of textiles and benefits.
Concepts of image processing.
Design Fundamentals
Development of printable designs for screen printing through CAD- ArahPaint; tools of ArahPaint software module; scanning of pictures and editing.
Calculation of Fabric parameters through CAD.

Unit-II
Electronic Dobby
Working principle, machine parameters.
Design features, drive arrangement, system for pattern data transfer and design development.
Electronic Jacquard
Working principle, constructional variants, various electronic jacquard systems.
Selection system, pattern data transfer and management.

Unit-III
CAD for Dobby, Jacquard
Development of Dobby Designs through ArahWeave,

Unit-IV
Development of figures, geometric ornamentations, arrangement of figures.
Narrow fabric production through CAD, Carpet designing through CAD.
Embroidery Designing through CAD, 3-D draping-Application and tools.

Suggested Text Books and References
TT-312N
MULTI FIBRE SPINNING

L T P
3 1 -

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

Unit I
Characteristics of man-made fibres, objectives of blending, selection of fibre specification for blending, processing of short, medium and long staple man made fibres on cotton system, measures of blend intimacy, factors influencing blend intimacy, structure an properties of blend yarns, Effect of blend composition & fibre characteristics on properties of blended yarn. Blend mechanics. Advantages & disadvantages of different blending technique. Tinting for a blend spinning of dyed fibres.

Unit II

Unit III

Unit IV
Silk Spinning: Introduction to twisting and spinning of silk fibres, Spun silk processing – Spreader, Sett Frame, Drawbox, Rover. Waste Spinning: Cotton waste and its varieties, classification and possible end uses, machines and processes to produce waste yarns e.g. condenser system, coiled system.

Suggested Text Books and References
5. Jute- Fibre to yarn by R R Atkinson.
7. Wool Spinning vol I & II by Lipenkov.
TT-314N
GARMENT TECHNOLOGY LAB

<table>
<thead>
<tr>
<th>L</th>
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<th>P</th>
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<tbody>
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<td></td>
<td>3</td>
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Practical/viva: 60 marks
Sessional: 40 marks
Total: 100 marks
Duration of Exam: 3 hours

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Title of Experiment</th>
<th>No. of Turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Developments of patterns based on anthropometric data.</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Working on Sewing Machines.</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Production of different types of stitches (Chain stitch, Lock stitch &amp; Overlock stitch).</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Determination of seam strength.</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>Determination of seam pucker.</td>
<td>1</td>
</tr>
</tbody>
</table>

TT-316N
KNITTING TECHNOLOGY LAB

<table>
<thead>
<tr>
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<th>T</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Practical/viva: 60 marks
Sessional: 40 marks
Total: 100 marks
Duration of Exam: 3 hours

List of Experiments

1. Working on Flat Knitting Machine.
3. Setting of knitting Cam.
4. Development of derivative knitted structures on flat bed knitting machine.
5. Analysis of knitted structures.
6. Determination of $K_s$, $K_c$ and $K_w$ values.
7. Effect of stitch length, stitch density, course count, wale count on fabric arial density.
## TT-318N
**COMPUTER AIDED FABRIC MANUFACTURING LAB**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Title of Experiment</th>
<th>No. of Turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Working with Paint Module of the software</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Scanning and editing a fabric artwork.</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Development of Dobby design on system.</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Development of Jacquard design on system.</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>3D draping and its tools.</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Weave simulation on CAD.</td>
<td>2</td>
</tr>
<tr>
<td>7.</td>
<td>Development of label design through CAD.</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Production of sample in print format</td>
<td>2</td>
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</tbody>
</table>

**Practical/viva: 60 marks**

**Sessional: 40 marks**

**Total: 100 marks**

**Duration of Exam: 3 hours**

## TT-320N
**TEXTILE TESTING-II LAB**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Title of Experiment</th>
<th>No. of Turns</th>
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<tbody>
<tr>
<td>1.</td>
<td>To determine the stiffness property of the fabric.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>To determine the tensile strength of the fabric.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>To determine the tearing strength of the fabric.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>To determine the bursting strength of the fabric.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>To determine air permeability of fabrics.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>To determine the shower proof property of a fabric.</td>
<td></td>
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<tr>
<td>7.</td>
<td>To determine the drape property of fabrics.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>To determine the crimp and Areal density of fabrics.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>To determine the pilling property of the fabric.</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>To determine water vapor permeability of the fabric.</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>To determine the thermal comfort property of the fabric.</td>
<td></td>
</tr>
</tbody>
</table>

**Practical/viva: 60 marks**

**Sessional: 40 marks**

**Total: 100 marks**

**Duration of Exam: 3 Hrs**

### List of Experiments
1. To determine the stiffness property of the fabric.
2. To determine the tensile strength of the fabric.
3. To determine the tearing strength of the fabric.
4. To determine the bursting strength of the fabric.
5. To determine air permeability of fabrics.
6. To determine the shower proof property of a fabric.
7. To determine the drape property of fabrics.
8. To determine the crimp and Areal density of fabrics.
10. To determine the pilling property of the fabric.
11. To determine water vapor permeability of the fabric.
12. To determine the thermal comfort property of the fabric.

**Note:** 8 experiments from the above list are to be performed by each student. The above experiment should be conducted and shall be decided on factors like:

- **a)** Facilities installed at the Institute.
- **b)** Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat/any other reputed establishment.
- **c)** Trend of technological developments in National & International perspective.
**Programme Objectives:**

The Chemical Engineering graduates will be able to:

1. Exhibit knowledge of basic sciences, concepts and principles of Chemical Engineering.
2. Comprehend, analyze, design and implement engineering systems with a focus on research, innovation and sustainability.
3. Work in multidisciplinary team & cater to the needs of process industry with appropriate safety, health & environmental regulations.
4. Demonstrate effective communication skills, leadership qualities and develop into successful Entrepreneurs.

**Objectives regarding Syllabus and Scheme for Bachelor degree of Chemical Engineering:**

Chemical Engineering Bachelors courses such as Transfer Operations, Thermodynamics, Reaction Engineering, Process Control and Process Design help to develop a modularized understanding of these independent fields, with the expectation that the whole process is the sum of these individual parts.

**Semester-V (w.e.f. 2017-18)**

<table>
<thead>
<tr>
<th>SN</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Dur. of Exam (Hrs.)</th>
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**Semester-VI (w.e.f. 2017-18)**

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<th>Dur. of Exam (Hrs.)</th>
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<td>Process Dynamics and Control (P)</td>
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<td>10</td>
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**Note:** Industrial Training which was undergone by the students after IV sem is to be evaluated during V sem as (CHE-319 N) through submission of certified computerized report to the Head of the Department followed by viva-voce, seminar/presentation.

**Note:** The students will have to undergo another six weeks Industrial Training after VI sem and it will be evaluated during VII sem through submission of certified computerized report to the Head of the Department followed by viva-voce, seminar/presentation.
<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Theory</th>
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<th>Time</th>
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<td>4</td>
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<td>-</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td>3 (Hrs.)</td>
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</table>

**Purpose**: To familiarize the students with the concepts of Diffusion in fluids, Theories of mass transfer, coefficients, Humidification and Dehumidification, Drying Crystallization

**Course Outcomes**

**CO1**: To familiarize with types of diffusion and theories of mass transfer coefficient, concept of equilibrium curve, operating line

**CO2**: To familiarize with humidifiers and dehumidifiers. Design of cooling towers

**CO3**: To familiarize with drying mechanism and types of driers

**CO4**: To familiarize with Crystallization mechanism and types of crystallizers

**Paper Setter Note**: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**

**Diffusion in fluids**: Molecular and eddy diffusion, Diffusivity; Diffusion through liquids and gases. Interphasemass Transfer: Theories of mass transfer, coefficients, concept of overall mass transfer coefficient, correlation for mass transfer coefficient ideal stage concept of single and multiple stage operation in co and counter current modes, concept of equilibrium curve, operating line.

**UNIT – II**

**Humidification and Dehumidification**: Adiabatic saturation temperature, wet bulb temperature, saturation temperature. Psychometric chart, dehumidification, humidifiers and dehumidifiers. Simultaneous heat and mass transfer. Design of cooling towers, determination of NTU, HTU.

**UNIT – III**

**Drying**: Principle of drying, mechanism and rate of drying, types of driers, calculations for batch and continuous dryers. Vacuum dryers.

**UNIT – IV**

**Crystallization**: Crystallization mechanism, growth of crystals, classification of crystallizers, material and energy balance, enthalpy concentration diagram super saturation. Batch crystallizers, continuous. Crystallizer, fractional crystallization.

**TEXT BOOKS**:

3. Transport processes and separation process principles. by C J Geankoplis,PHI,4th ed.

**REFERENCE BOOKS**:

8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**

**Kinetics of Homogenous reactions:** Concept of reaction rate, rate equation, order and molecularity, Collision and activated complex theories. Interpretation of batch reactor data: constant volume and variable volume batch reactors, integral and differential methods of analysis, continuous reactors, effects of concentration and temperature (Arrhenius equation).

**UNIT- II**

**Design of Single Ideal Reactors:** Design equation for single ideal reactor for single reactions for batch reactor, plug flow reactor and CSTR, Thermal stability of reactors, optimum temperature progression for first order reversible reactions.

**UNIT- III**

**Multi reactions:** Parallel and series reactions, mixed reactions, autocatalytic reactions, choice of reactors for simple and complex reactions, multiple reaction system.

**UNIT- IV**

**Temperature and Pressure Effects:** Calculations of heats of reaction and equilibrium constants. General graphical design procedure, Optimum temperature progression, and Energy balance equations in adiabatic and non-adiabatic case, Performance of mixed, plug flow reactors

**TEXT BOOKS:**


**REFERENCE BOOKS:**

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

UNIT-I

UNIT-II
Molecular Weight Estimation: Average molecular weight, number average and weight average molecular weight, polydispersity, degree of polymerization. Methods of determination of molecular weight.

UNIT-III
Polymer processing: Thermoforming, injection molding, extrusion molding, calendaring rotational casting, film casting, blow molding, foaming' Fiber spinning wet dry and melt.

UNIT-IV

TEXT BOOKS:
1. Polymer science by Gowarikar, Wiley eastern
2. Polymer science of plastics and rubberc by P gosh, McGrrow Hill.
CHE-307 N  Chemical Engineering Thermodynamics-II

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Theory</th>
<th>Sessional</th>
<th>Total</th>
<th>Time</th>
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<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>-</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**
To understand the concept of residual properties, vapor liquid equilibrium, chemical equilibrium

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO1</th>
<th>To familiarize with laws of thermodynamics, Thermodynamic properties of pure fluids, residual properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>To understand the Thermodynamic properties of homogeneous mixtures, Partial molar properties, excess Properties</td>
</tr>
<tr>
<td>CO3</td>
<td>To understand the vapour-liquid equilibria (vLE), miscible azeotropes, Analysis of multi-component multiphase system</td>
</tr>
<tr>
<td>CO4</td>
<td>To understand Chemical Equilibria, effect of temperature and pressure on equilibrium constant, Duhem's theorem for reacting system.</td>
</tr>
</tbody>
</table>

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**

Review of laws of thermodynamics, their application to real processes, PVT behavior of pure fluids, virial equations, and generalized correlations, Relationships among thermodynamic properties, Thermodynamic properties of pure fluids: concept of residual properties, Thermodynamics properties of single and two-phase systems, generalized correlations for thermodynamic properties of gases.

**UNIT-II**

**Thermodynamic properties of homogeneous mixtures:** Property relationship for systems of variable composition: Partial molar properties: fugacity and fugacity coefficients, fugacity in ideal solutions property changes of mixing - activity, heat effects in mixing processes, excess Properties activity coefficients, gaseous mixtures

**UNIT-III**

**Phase Equilibria:** importance of phase equilibria in process industries, vapour-liquid equilibria (vLE), miscible azeotropes, VLE calculations at low and high pressures’ Analysis of multicomponent multiphase system. Activity coefficients from experimental data in all Margules, Van-Laar, Wilson equations

**UNIT-IV**

**Chemical Equilibria:** Reaction coordinates application of equilibrium criteria to chemical Reactions standard Gibbs free energy change and the equilibrium constant effect of temperature on equilibrium constant, effect of temperature on equilibrium constant evaluation of equilibrium constants and composition, calculation of equilibrium compositions for single reactions, phase rule and Duhem's theorem for reacting system.

**TEXTBOOKS:**

2. Chemical Engineering Thermodynamics: Y.V. .C.Rao, Universities Press (India) Ltd., Hyderabad, India’

**REFERENCE BOOKS:**

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO1</th>
<th>To understand the concept of oils and fats, soaps and detergent</th>
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</thead>
<tbody>
<tr>
<td>CO2</td>
<td>To understand sugar industry and khandsari technology</td>
</tr>
<tr>
<td>CO3</td>
<td>To understand the refinery operation for petrol, polymer types and modes of polymerization</td>
</tr>
<tr>
<td>CO4</td>
<td>To understand the pulp and paper processes, paints and varnishes</td>
</tr>
</tbody>
</table>

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**

**Oils and fats:** Major oil seeds, solvent process, hydrogenation of oils.

**Soaps and Detergents:** Raw material, manufacturing of detergents, biodegradability, and glycerin manufacture, fat splitting, purification of fatty acids.

**UNIT-II**

**Sugar Industry:** Cane production and varieties, manufacturing equipment and technology, cane sugar refining, Bagasse utilization, Khandsari technology, Production of Ethanol.

**UNIT-III**

**Petroleum Refining:** General composition of crude oil, typical refinery operations for obtaining useful products, their utilization for manufacture of ethylene glycol, acrylonitile, styrene, and butadiene. Polymer: classification of polymers, degree of polymerization, modes of polymerization synthetic fibers (Nylon, terylene) synthetic & natural rubbers.

**UNIT-IV**

**Pulp and Paper:** pulping processes, recovery of chemicals, stock preparation and paper making, recovery, of chemicals, viscose rayon. Surface-coating Industries: paints, pigments, varnishes, Lacquers.

**TEXTBOOKS:**
List of Experiments:

1. To Determine the Reaction Kinetics between Ethyl Acetate and Sodium Hydroxide at Room Temperature by Integral Method of Analysis.
2. To Determine Activation Energy of the Reaction between Sodium-Thio-sulphate and Hydrochloric acid.
3. To Determine the Kinetics of the Reaction between the Ethyl Acetate and Sodium Hydroxide (NaOH) under Conditions of Excess Ethyl Acetate at Room Temperature.
4. To Determine the Activation Energy and Frequency Factor for Reaction between Ethyl Acetate and Sodium Hydroxide (NaOH).
5. To Determine the Rate of Reaction between Ethyl Acetate and Sodium Hydroxide (NaOH) at Room Temperature by the Method of Half Life Period.
6. To Study Cascade CSTR.
7. To Study Saponification Reaction in PFR.

List of Experiments:

1. To determine heat of solution
2. To study the elevation in boiling point of solution
3. To determine the heat of reaction between acid and base.
4. To determine depression in freezing point
5. To determine specific heat of conducting substance
6. To study the equilibrium curve for carbon tetrachloride and toluene mixture.
CHE-315 N

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<thead>
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<th>Tutorial</th>
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**Purpose**
To make student able to understand concept of mass transfer coefficient and NTU in cooling tower, moisture content of material.

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO1</th>
<th>Students will be able to determine mass transfer coefficient of liquid.</th>
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<tbody>
<tr>
<td>CO2</td>
<td>Students will be able to determine Number of Transfer Unit (NTU in cooling tower).</td>
</tr>
<tr>
<td>CO3</td>
<td>Students will be able to determine moisture content of material.</td>
</tr>
<tr>
<td>CO4</td>
<td>Students will be able to determine the gas film coefficient of fluid mixture</td>
</tr>
</tbody>
</table>

**List of experiments**

1. Determination of Gas Film Coefficient in a Wetted Wall Column Using Air-Water System.
2. To Find Out The Critical Moisture Content of a Given Material And to Find out the Constant Rate and Falling Rate Periods.
3. Determine the Diffusion Coefficient of Vaporizing of a Liquid in Air at Different Temperatures.
4. (a) To Study Absorption of CO₂ in Aqueous NaOH Solution in a Sieve Plate Column.
   (b) To Determine the Gas Phase Mass Transfer Coefficient $K_{ga}$.
5. To Determine Number of Transfer Unit (NTU), Height of Transfer Unit (HTU) and $K_{ga}$ for a Given Cooling Tower.

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CHE-317 N

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**Purpose**
To provide practical knowledge for the preparation of caustic soda, extraction of oil from groundnut seed, Saponification value and preparation of detergent.

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO1</th>
<th>Students will be able to determine acid value and Saponification value of oil</th>
</tr>
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<tbody>
<tr>
<td>CO2</td>
<td>Students will be able to extract oil from groundnut seeds</td>
</tr>
<tr>
<td>CO3</td>
<td>Students will be able to prepare caustic soda and detergent</td>
</tr>
<tr>
<td>CO4</td>
<td>Students will be able to do analysis of water by chemical methods</td>
</tr>
</tbody>
</table>

**List of experiments**

1. To Prepare caustic soda by chemical method.
2. To determine acid value of given sample of oil.
3. To Prepare hydrated lime from given calcium carbonate powder.
4. To extract the oil from groundnut seed and determine its extraction coefficient.
5. To determine Saponification value of given sample of oil.
6. To carry out analysis of water by chemical methods.
7. To prepare detergent in the lab and to carry out its cost analysis.
CHE-302 N  

<table>
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**Purpose**

To understand the basic concept and application of Vapor Liquid equilibrium, McCabe Thiele Method, Absorption, Absorption and Extraction

**Course Outcomes**

**CO1**

To understand the concept of vapor liquid equilibrium, methods of distillation, McCabe Thiele method for number of plates

**CO2**

To understand the concept of absorption, number of transfer units for the design of packed absorbers.

**CO3**

To understand the concept of extraction, extraction efficiency, extractors.

**CO4**

To understand adsorption and its characteristics, equilibrium stage wise adsorption

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**


**UNIT-II**


**UNIT-III**


**UNIT-IV**

**Adsorption:** Adsorption, types of Adsorption characteristics of adsorbents. Adsorption equilibrium stage wise and continuous contacting of fluid and solid phase.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
<table>
<thead>
<tr>
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<th>Tutorial</th>
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**Purpose**
To understand the concept of semi batch reactor, non ideal reactor, catalyst and catalysis, porous catalyst and designing of fixed and packed back reactor.

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO1</th>
<th>To understand the concept semi batch reactor and models for non ideal reactor.</th>
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</thead>
<tbody>
<tr>
<td>CO2</td>
<td>To understand the basic concept catalyst, types of catalyst and characteristics of catalyst.</td>
</tr>
<tr>
<td>CO3</td>
<td>To familiarize with the concept of porous solids and design for gas-liquid and gas-solid non-catalytic reactor.</td>
</tr>
<tr>
<td>CO4</td>
<td>To familiarize with the concept of design of fixed bed and packed bed reactor.</td>
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</tbody>
</table>

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT- I**

**UNIT-II**
Introduction to catalysis, Classification of catalysts. Preparation and physical characteristics of solid catalyst, concept of physical adsorption and chemisorptions.

**UNIT-III**
Diffusion of mass and heat in porous solids with and without external diffusion resistance, Effectiveness factor, Fluid- fluid reaction modeling based on film and penetration theory. Enhancement factor. Reactor system and design for gas-liquid and gas-solid non-cata
tytic systems.

**UNIT- IV**
Fixed bed catalytic reactors, single and multibed adiabatic reactors, multitubular fixed bed reactors. Design equations for fixed bed reactors using pseudo homogeneous one and two-dimensional models, Design aspects of fluidized bed reactors.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
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**Purpose**: To provide the knowledge and information about the Laplace transformation, controllers, stability, Ziegler-Nichols Controller settings.

**Course Outcomes**

| CO1 | To familiarize about the Laplace Transformation, first order systems and transportation lag |
| CO2 | To familiarize about Linear closed-loop systems, control systems, Controllers |
| CO3 | To understand the Stability, Routh Test of stability, Root Locus |
| CO4 | To familiarize with the Controller tuning and testing of sine wave and step wave |

**Paper Setter Note**: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**

Laplace Transformation, Inversion by partial fractions. Properties of transform, Linear Open-loop System, Response of first-order systems, physical examples of first order system, response of first order systems and Transportation Lag.

**UNIT-II**

Linear closed-loop systems control systems, Controllers and Final control elements, closed-loop Transfer functions. Transient response of Simple control Systems Control valve, Construction, valve sizing and characteristics.

**UNIT –III**

Stability, Route Test of stability, Root Locus. Introduction to Frequency Response, Bode diagram, Gain Margins and Phase Margins.

**UNIT –IV**

Controller Tuning (Ziegler- Nichols Controller settings), Process identification, Identification methods: Step test data, Sine Wave testing, Pulse testing, Introduction to advanced control technique, cascade control, ratio control, overwrite control, feed forward control, Auto tuning.

**TEXTBOOKS**:


**REFERENCE BOOKS**:

CHE-308 N  Numerical Methods in Chemical Engineering

<table>
<thead>
<tr>
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</table>

**Purpose**
To understand the concept of types of errors, Eigen values and Eigen vectors of matrices, Non linear algebraic equations, Function evaluation, Ordinary differential equations

**Course Outcomes**

- **CO1**: To Introduce the concept of error, linear algebraic equations
- **CO2**: To familiarize with the Eigen values and Eigen vectors of matrices, non linear algebraic equations
- **CO3**: To understand the Linear Regression, Interpolation and Extrapolation Technique
- **CO4**: To familiarize with the Ordinary Differential Equations

**Paper Setter Note**: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**

**Errors**: Classification, significant digits and numerical stability.

**Linear algebraic equations**: Cramer's rule, Gauss Elimination and LU Decomposition Gauss-Jordan elimination, Gauss-Seidel and Relaxation Methods.

**UNIT-II**

**Eigen values and eigenvectors of matrices**: Faddeev Leverrier's Method, Power Method

**Non linear algebraic equations**: Single variable successive substitutions (Fixed Point Method), Multivariable successive substitutions, single variable Newton-Raphson Technique, Multivariable Newton-Raphson Technique.

**UNIT-III**

**Function evaluation**: Least squares curve-fit (Linear Regression), Newton's interpolation formulae (equal intervals), Newton's Divided Difference Interpolation Polynomial, Lagrangian Interpolation Unequal intervals), differentiation formulae, Integration formulae or Quadratures (Trapezoidal, Simpson's 1/3 and 3/8 rules), Extrapolation Technique of Richardson and Gaunt

**UNIT-IV**

**Ordinary differential equations**: Initial value problems; ode-ivps The Finite difference Technique

**TEXT BOOKS**


**REFERENCE BOOKS**:

<table>
<thead>
<tr>
<th>Purpose</th>
<th>To understand mathematical models of heat transfer, mass transfer, fluid flow, process dynamics and control</th>
</tr>
</thead>
</table>

**Course Outcomes**

- **CO1**: To understand the scope of mathematical model and transport equations
- **CO2**: To understand the mathematical model of batch reactor and multicomponent flash drum
- **CO3**: To understand Mathematical Modeling of Mass Transfer and Heat transfer Processes
- **CO4**: To familiarize with mathematical modeling of interacting and non-interacting system

**Paper Setter Note**: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**UNIT-I**


**UNIT-II**

- Mathematical Models: Series of isothermal CSTR & constant hold-up CSTR's, CSTR's With variable hold ups two heated tanks, gas phase pressurized CSTR’ Non isothermal CSTR & single component vaporizer, multicomponent flash drum, batch reactor with Mass transfer.

**UNIT-III**

- Mathematical Modeling of Mass Transfer and Heat transfer Processes: Ideal binary distillation column multi component non ideal distillation column, batch distillation with hold up, liquid extraction, absorption, adsorption, heat exchanger.

**UNIT-IV**

- Interacting and Non-Interacting Systems: Real CSTR modeled with and exchange volume Real CSTR modeled using by passing and dead space. Two CSTR's with interchange.

**TEXT BOOKS**:

2. Elements of Chemical Reaction Engineering by Fogler, prentice hall of India

**REFERENCE BOOK**:

1. Process optimization in chemical Engineer in by Edger Himmelblau.
### CHE-312 N

<table>
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<td>3 (Hrs.)</td>
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</table>

**Purpose**: To provide knowledge about operation of adsorption and absorption, solid-liquid extraction, distillation column

**Course Outcomes**

- CO1: To understand Batch distillation equation for known number of plates
- CO2: To familiarize operation of adsorption and absorption
- CO3: To understand how to calculate number of plates in distillation column experimentally
- CO4: To understand the concept of solid-liquid extraction

**LIST OF EXPERIMENTS:**

1. To estimate the batch distillation for a binary system and verify batch distillation equation for a known number of plate
2. To operate the column under different reflux conditions
3. To operate the column under total reflux conditions and estimate the minimum number of theoretical plates required
4. To calculate the percentage of recovery of phenol by using activated carbon as adsorbent
5. To study the effect of various system parameters like solvent temperature, solvent rate and particle size on the % recovery of oil from solid and determine the volume mass transfer coefficient in solid liquid extraction
6. To study absorption of CO\(_2\) in aqueous NaOH solution in a sieve plate column
7. Calculate the overall mass transfer coefficient (absorption)

### CHE-314 N

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<td>60</td>
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</table>

**Purpose**: To provide practical knowledge of the Trickle Bed Reactor, RTD curve for a Packed Bed Reactor, Saponification Reaction in PFR Reactor

**Course Outcomes**

- CO1: Student will be able to determine hydrodynamics of Trickle Bed Reactor
- CO2: Student will be able to study the Saponification Reaction in PFR Reactor.
- CO3: Student will be able to determine the critical Reynolds's no. of a fluid flowing through a coil.
- CO4: Student will be able to study kinetics of Emulsion Polymerization of Styrene

**LIST OF EXPERIMENTS:**

1. To Determine the hydrodynamics of Trickle Bed Reactor and involving the measurement of pressure drop holdup and flow regime
2. To Plot the RTD curve for a Packed Bed Reactor and determine the dispersion number
3. Performance of Semi-batch Reactor to Study the Second Order Saponification Reaction between Ethyl Acetate and NaOH
4. Study the Saponification Reaction in PFR Reactor and determine the reaction rate constant.
5. To Study the Saponification reaction in isothermal PFR and determine reaction rate constant
6. To determine the critical Reynolds's no. of a fluid flowing through a coil. To compare the pressure drop in a helical coil with that in straight pipe of same length inside diameter and surface roughness
7. To Study kinetics of Emulsion Polymerization of Styrene in Batch reactor under isothermal conditions
### CHE-316 N: Process Dynamics and Control (P)

<table>
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<tr>
<th>Lecture</th>
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**Purpose:** To provide the practical knowledge of First Order Linear and non linear System, interacting and non interacting system, Dynamic characteristics of Control Valve

**Course Outcomes**

**CO1**
Students will be able to compare dynamics of First Order and Second Order System Linear System.

**CO2**
Students will be able to know dynamics of First Order linear and non Linear System.

**CO3**
Students will be able to know dynamics of Interacting System and non interacting system.

**CO4**
Students will be able to study Dynamic characteristics of Control Valve.

**LIST OF EXPERIMENTS:**
1. Comparison between dynamics of First Order and Second Order System Linear System
2. To Study dynamics of First Order Linear System
3. To Study dynamics of First Order Non Linear System
4. To Study dynamics of dynamics of Manometer
5. To Study dynamics of Non Interacting System
6. To Study dynamics of Interacting System
7. To Study dynamics of Level Trainer
8. To study the Dynamic characteristics of Control Valve
9. To Study dynamics of Temperature Trainer

### CHE-318 N: Process Modeling (P)

<table>
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<th>Lecture</th>
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**Purpose:** To provide the knowledge of mathematical modeling of mass transfer, heat transfer equipments and reactors in Chemical Reaction Engg.

**Course Outcomes**

**CO1**
Students will be able to know the concept of Drag coefficient, Sedimentation, Size reduction.

**CO2**
Students will be able to know the principle and working of grinding in a ball mill, separation of dust particles from air and filtration of slurry.

**CO3**
Students will be able to know the solid separation techniques and size distribution of particles

**CO4**
Students will be able to determine the pressure drop in a packed bed.

**LIST OF EXPERIMENTS:**
1. To Model and Simulate a Gravity Flow Tank Using Euler Integration
2. To Model and Simulate Three CSTR in Series Using Euler Integration
3. To Model and Simulate a Non Isothermal CSTR
4. To Model and Simulate Binary Distillation Column
5. To Model and Simulate a Batch Reactor
6. To Model and Simulate Two Non Interacting Tank in Series
7. To Model and Simulate Two Interacting Tank in Series
### Bachelor of Technology (Civil Engineering)

#### Semester- V (w.e.f. session 2017-2018)

<table>
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*Note: The students will have to undergo another six weeks Field Training/Industrial Training after VI sem and it will be evaluated during VII sem through submission of certified report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.*

### Semester- VI (w.e.f. session 2017-2018)

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<td>Water Supply &amp; Treatment</td>
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<td>CE-314N</td>
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<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

*Note: The students will have to undergo another six weeks Field Training/Industrial Training after VI sem and it will be evaluated during VII sem through submission of certified report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.*
**Course Objective**: Students will acquire the knowledge about the methods of analysis of different structures.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Course Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Students will be able to study behavior in the form of S.F and B.M for continuous beams by influence line method.</td>
</tr>
<tr>
<td>II</td>
<td>Students will be able to analyze the behavior of rolling load on structures and fixed arches.</td>
</tr>
<tr>
<td>III</td>
<td>Students will be able to analyze the frames structures.</td>
</tr>
<tr>
<td>IV</td>
<td>Students will be able to study about methods for stiffness and flexibility.</td>
</tr>
</tbody>
</table>

**UNIT-I**

**Influence lines:**
Introduction, influence lines for three hinged and two hinged arches, load position for Max. S.F. and B.M. at a section in the span.

**Influence Line for statically indeterminate Beams:**

**UNIT-II**

**Rolling Loads:**
Introduction, Single concentrated load, uniformly distributed load longer than span, shorter than span, two point loads, several point loads, Max. B.M. and S.F. Absolute, Max. B.M.

**Fixed Arches:**
Expression for Horizontal Thrust and Bending Moment at a section, Elastic centre

**UNIT-III**

**Kani's Method:**
Analysis of continuous beams and simple frames, analysis of frames with different column lengths and end conditions of the bottom story.

**UNIT-IV**

**Approximate Analysis of frames:**
(i) For vertical loads, (ii) for lateral loads by Portal method & Cantilever method.

**Matrix Methods**
Introduction, Stiffness Coefficients, Flexibility Coefficients, development of flexibility & stiffness matrices for plane frame, Global axis and local axis, analysis of plane frame, pin jointed and rigid jointed.

**Paper Setter Note**: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**Books Recommended:**
1. Indeterminate structures, R.L.Jindal S.Chand & Co., N.Delhi.
Course Objective: To learn about the design of different types of structures by using reinforced cement concrete (RCC)

**UNIT-I**

**Elementary treatment of concrete technology:**
Physical requirements of cement, aggregate, admixture and reinforcement, Strength and durability, shrinkage and creep. Design of concrete mixes, Acceptability criterion, I.S. Specifications,

**Design Philosophies in Reinforced Concrete:**
Working stress and limit state methods, Limit state v/s working stress method, Building code, Normal distribution curve, characteristic strength and characteristics loads, design values, Partial safety factors and factored loads, stress-strain relationship for concrete and steel.

**UNIT-II**

**Working Stress Method:**
Basic assumptions, permissible stresses in concrete and steel, design of singly and doubly reinforced rectangular and flanged beams in flexure, steel beam theory, inverted flanged beams, design examples.

**Limit State Method:**
Basic assumptions, Analysis and design of singly and doubly reinforced rectangular flanged beams, minimum and maximum reinforcement requirement, and design examples.

**UNIT-III**

**Analysis and Design of Sections in shear bond and torsion:**
Diagonal tension, shear reinforcement, development length, Anchorage and flexural bond, Torsional, stiffness, equivalent shear, Torsional reinforcement, Design examples.

**Columns and Footings:**
Effective length, Minimum eccentricity, short columns under axial compression, Uniaxial and biaxial bending, slender columns, Isolated and wall footings, Design examples.

**Serviceability Limit State:**
Control of deflection, cracking, slenderness and vibrations, deflection and moment relationship for limiting values of span to depth, limit state of crack width, Design examples.

**UNIT-IV**

**Concrete Reinforcement and Detailing:**
Requirements of good detailing cover to reinforcement, spacing of reinforcement, reinforcement splicing, Anchoring reinforcing bars in flexure and shear, curtailment of reinforcement.

**One way and Two Ways Slabs:**
General considerations, Design of one way and two ways slabs for distributed and concentrated loads, Nonrectangular slabs, openings in slabs, Design examples.

**Retaining Walls:**
Classification, Forces on retaining walls, design criteria, stability requirements, Proportioning of cantilever retaining walls, counterfort retaining walls, criteria for design of counterforts, design examples.

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections. Time Duration: 4 Hours.

**Books:**
5. SP-16(S&T)-1980, 'Design Aids for Reinforced Concrete to IS:456, BIS, N.Delhi.
7. Reinforced Concrete Design – Pillai and Menon, TMH, New Delhi.
Hydrology is the scientific study of the movement, distribution, and quality of water on Earth and other planets, including the water cycle, water resources and environmental watershed sustainability.

**UNIT-I**

**Introduction:**
Hydrologic cycle, scope and application of hydrology to engineering problems, drainage basins and its characteristics, stream geometry, hypsometric curves.

**Precipitation:**
Forms and types of precipitation, characteristics of precipitation in India, measurement of Precipitation, recording and non-recording rain gauges, rain gauge station, rain gauge network, estimation of missing data, presentation of rainfall data, mean precipitation, depth-area-duration relationship, frequency of point rainfall, intensity-duration-frequency curves, probable max. precipitation.

**UNIT-II**

**Evaporation & Transpiration:**
Process, evaporimeters and empirical relationships, analytical method, reservoir evaporation and methods of its control, transpiration, evapotranspiration and its measurement, Penman's equation and potential evapotranspiration.

**Infiltration:**
Infiltration process, initial loss, infiltration capacity and measurement of infiltration, infiltration indices.

**UNIT-III**

**Runoff:**
Factor affecting run-off, estimation of runoff, rainfall-run off relationships, measurement of stage-staff gauge, wire gauge, automatic stage recorder and stage hydrograph, measurement of velocity-current meters, floats, area velocity method, moving boat and slope area method, electromagnetic, ultra-sonic and dilution methods of stream flow measurement, stage discharge relationship.

**Floods and Flood Routing:**
Flood frequency studies, recurrence interval, Gumbel's Method, flood routing, reservoir flood routing, channel flood routing and flood plain mapping.

**Hydrograph:**
Discharge hydrograph, components and factors affecting shape of hydrograph, effective rainfall, unit hydrograph and its derivation, unit hydrograph of different durations, use and limitations of UH, triangular UH, Snyder's synthetic UH, floods, rational methods, empirical formulae.

**UNIT-IV**

**Ground Water:**
Occurrence, types of aquifers, compressibility of aquifers, water table and its effects on fluctuations, wells and springs, movement of ground water, Darcy's law, permeability and its determination, porosity, specific yield and specific retention, storage coefficient, transmissibility.

**Ground Water Quality:**
Indian and International standards, pollution of ground water and possible source, remedial and preventive measures.

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**Books:**
1. Engineering Hydrology by K.Subramanya, TMH, New Delhi
3. Hydrology for Engineers by Linsely, Kohler, Paulhus.
4. Elementary Hydrology by V.P.Singh.
Code | Nomenclature of Subject | L | T | Int. | Ext. | Total | Time
--- | --- | --- | --- | --- | --- | --- | ---
CE-307N | GEOTECHNOLOGY-I | 3 | 1 | 25 | 75 | 100 | 3 Hr

Course Objective: The subject gives a better idea about the soil and its properties & also design of types of foundation.

<table>
<thead>
<tr>
<th>UNIT</th>
<th>Course Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Students will be able to study the sub-surface soil and its properties and methods of sampling and testing.</td>
</tr>
<tr>
<td>II</td>
<td>Students will be able to study the different types of shallow foundation and its design.</td>
</tr>
<tr>
<td>III</td>
<td>Students will be able to study the different types of pile foundation and its design.</td>
</tr>
<tr>
<td>IV</td>
<td>Students will be able to study the different types of Drilled Piers and Caisson Foundations and their design.</td>
</tr>
</tbody>
</table>

**UNIT-I**

Sub-Surface Exploration: Purpose, stages in soil exploration, depth and lateral extent of exploration, guidelines for various types of structures, ground water observations, excavation and boring methods, soil sampling and disturbance, major types of samplers, sounding methods-SCPT, DCPT, SPT & interpretation, geo-physical methods, pressure-meter test, exploration logs.

Drainage & Dewatering: Introduction, ditches and sumps, well point systems, shallow well system, deep well drainage, vacuum method, Electro-osmosis, consolidation by sand piles, Eductor method.

**UNIT-II**


Shallow Foundations-II: Various causes of settlement of foundation, allowable bearing pressure based on settlement, settlement calculation, elastic and consolidation settlement, allowable settlement according to I.S. Code. Plate load test and its interpretation, bearing capacity from penetration tests, design bearing capacity.

Shallow Foundations-III: Situation suitable for the shallow foundations, types of shallow foundations and their relative merits, depth of foundation, footing on slopes, uplift of footings, conventional procedure of proportioning of footings, combined footings, raft foundations, bearing capacity of raft in sands and clays, various methods of designing rafts, floating foundations.

**UNIT-III**

Pile Foundations-I: Introduction, necessity of pile foundations, classification of piles, load capacity, static analysis, analysis of pile capacity in sands and clays, dynamic analysis, pile load tests, negative skin friction, batter piles, lateral load capacity, uplift capacity of single pile, under-reamed pile.

Pile Foundations-II: Group action in piles, pile spacing, pile group capacity, stress on lower strata, settlement analysis, design of pile caps, negative skin friction of pile group, uplift resistance of pile group, lateral resistance, batter pile group.

**UNIT-IV**

Drilled Piers and Caisson Foundations: Drilled piers-types, uses, bearing capacity, settlement, construction procedure. Caissons-Types, bearing capacity and settlement, construction procedure. well foundations-shapes, depth of well foundations, components, factors affecting well foundation design lateral stability, construction procedure, sinking of wells, rectification of tilts and shifts, recommended values of tilts & shifts as per I.S.3955.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books Recommended:
5. Foundation Design by Teng, Prentice Hall
Code | Nomenclature of Subject | L | T | Int. | Ext. | Total | Time
--- | --- | --- | --- | --- | --- | --- | ---
CE-309N | PROJECT PLANNING & MANAGEMENT | 3 | 1 | 25 | 75 | 100 | 3 Hr

**Course Objective**
To have better understanding about the planning and management of construction. Projects.

<table>
<thead>
<tr>
<th>UNIT</th>
<th>Course Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Students will be able to study the construction contracts and their management.</td>
</tr>
<tr>
<td>II</td>
<td>Students will be able to plan the construction projects and job layout.</td>
</tr>
<tr>
<td>III</td>
<td>Students will be able to study the time management of the construction projects by different methods.</td>
</tr>
<tr>
<td>IV</td>
<td>Students will be able to study the cost management and quality control analysis of the construction projects.</td>
</tr>
</tbody>
</table>

**UNIT-I**

Construction Management
Significance, objectives and functions of construction management, types of constructions, resources for construction industry, stages for construction, construction team, engineering drawings.

Construction Contracts & Specifications
Introduction, types of contracts, contract document, specifications, important conditions of contract, arbitration.

**UNIT-II**

Construction Planning
Introduction, work breakdown structure, stages in planning-pre-tender stages, contract stage, scheduling, scheduling by bar charts, preparation of material, equipment, labour and finance schedule, limitation of bar charts, milestone charts.

Construction Organization
Principles of Organization, communication, leadership and human relations, types of Organizations, Organization for construction firm, site organization, temporary services, job layout.

**UNIT-III**

Network Techniques in Construction Management-I: CPM
Introduction, network techniques, work break down, classification of activities, rules for developing networks, network development-logic of network, allocation of time to various activities, Fullkerson’s rule for numbering events, network analysis, determination of project schedules, critical path, ladder construction, float in activities, shared float, updating, resources allocation, resources smoothing and resources leveling.

Network Techniques in Construction Management-II: PERT
Probability concept in network, optimistic time, pessimistic time, most likely time, lapsed time, deviation, variance, standard deviation, slack critical path, probability of achieving completion time, central limit theorem.

**UNIT-IV**

Cost-Time Analysis
Cost versus time, direct cost, indirect cost, total project cost and optimum duration, contracting the network for cost optimization, steps in time cost optimization, illustrative examples.

Inspection & Quality Control
Introduction, principles of inspection, enforcement of specifications, stages in inspection and quality control, testing of structures, statistical analysis.

**Paper Setter Note:** 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

**Books Recommended**
2. PERT & CPM -Principles & Applications by L.S.Srinath. Affiliated East-west Press (P)Ltd.
UNIT


Aggregates: Aggregates, classification of aggregates based on petrography, size, shape and textures, deleterious substances in aggregates, bulking of fine aggregates, sieve analysis, grading of aggregates as per IS-383-1970, fineness modulus, Maximum size of aggregate, Quality of mixing water, curing water.


Non-Destructive Testing of Concrete: Significance of Non-Destructive Testing, Rebound Hammer, Ultrasonic pulse velocity techniques, Penetration techniques, pullout tests, vibration methods, radioactive techniques, Cover meter, core-tests.

Deterioration of Concrete & its Prevention: Causes of concrete deterioration, deterioration by water, surface weir, frost action, deterioration by chemical reactions, sulphate attack, alkali-aggregate reaction, corrosion of embedded steel in concrete, Prevention of deterioration of concrete.

Repair Technology for Concrete Structures: Symptoms and diagnosis of distress, evaluation of cracks, repair of cracks, common types of repairs, distress in fire damaged structures, underwater repairs.

Special Concrete: Light weight concrete, definition and its properties, applications, high strength concrete, definitions, its properties and applications, Mass Concrete, waste material based concrete, shortcrete, fiber reinforced concrete: Materials Fibres types and properties, ferrocement, polymer concrete composites, heavy weight concrete for radiation shielding.

Prestressed Concrete: Introduction, basic concepts, classifications and types of prestressing, prestressing systems, and properties of materials, pre tensioned and post tensioned concrete elements.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

TEXT BOOKS
5. Mehta P K “Microstructure of Concrete” Indian Concrete Institute and ACC, Bombay.
### LIST OF EXPERIMENTS

1. Experiment on a two hinged arch for horizontal thrust & influence line for Horizontal thrust
2. Experimental and analytical study of a 3-bar pin-jointed Truss.
3. Experimental and analytical study of deflections for unsymmetrical bending of a Cantilever beam.
4. Begg's deformeter- verification of Muller Breslau principle.
5. Experimental and analytical study of an elastically coupled beam.
6. Determine the Forces in members of redundant frames.
7. Sway in portal frames - demonstration.

**References:**
1. A Laboratory Manual on Structural Mechanics by Dr. Harwinder Songh; New Academic Publishing Comp. Ltd.

### LIST OF EXPERIMENTS

1. To determine the standard consistency and initial and final setting time of cement using Vicat's apparatus.
2. To determine the Fineness of cement by Sieve analysis and Blaine's air permeability method.
3. To determine the (1) specific gravity of cement (2) Soundness of cement by Le Chatelier's apparatus.
4. To determine the Compressive strength of cement.
5. To Determine the Fineness Modulus, Bulk Density, Water Absorption and Specific gravity of Fine Aggregates.
6. To Determine the Fineness Modulus, Bulk Density, Water Absorption and Specific gravity of Coarse Aggregates.
7. Mix Design of Concrete by IS methods.
10. To Determine the Split Tensile and Flexural strength of Concrete.
11. To Determine the Bond strength between steel bar and concrete by pull-out test.
12. To evaluate the Non-destructive testing of concrete by (1) Rebound hammer, (2) ultrasonic pulse velocity test.
13. To Determine the Compressive strength of Brick and Tile as IS standard.

**Books Recommended:**
3. Concrete Technology – Nevellie, Pearson Education.
LIST OF EXPERIMENTS

2. Shrinkage Limit Determination.
5. Consolidated Undrained (CU) Triaxial Test with Pore Water Pressure measurement.
6. Consolidation Test.
7. Undisturbed Sampling.
9. Dynamic Cone Penetration Test.
10. Model Plate Load Test.

Books:
Course Objective: To impart knowledge and ability to design various steel structures.

UNIT  Course Outcome

I. Students will be able to familiar with the Elementary Plastic Analysis and Design of steel structures.

II. Students will be able to design steel water tank and steel stacks and their stability checks.

III. Students will be able to design steel towers and Cold Formed Sections and their stability checks.

IV. Students will be able to design steel industrial building and their stability checks.

UNIT-I

Elementary Plastic Analysis and Design:
Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, analysis, plastic analysis applied to steel beams and simple portal frames and design.

UNIT-II

Design of Water Tanks:
Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging.

Design of Steel Stacks:
Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.

UNIT-III

Towers:
Transmission line towers, microwave towers, Design loads, classification, design procedure and specification.

Cold Formed Sections:
Introduction and brief description of various types of cold formed sections, local buckling, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

UNIT-IV

Industrial Buildings:
Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books:
3. Design of Steel Structures, Gaylord & Gaylord, MGH, Newyork/International Students Ed.
UNIT-I
Introduction: Irrigation-necessity, advantages, disadvantages, impact of irrigation on human environment, need and development of irrigation in India, crops and crop seasons, ideal cropping pattern and high yielding varieties of crops.

Soil-water relationship and irrigation methods: Soil-water relationship, root zone soil water, infiltration, consumptive use, field capacity, wilting point, available moisture in soil, GCA, CCA, intensity of irrigation, delta, base period, Kor depth, core period, frequency of irrigation, duty of water, relation between delta, duty and base period, irrigation requirement, flooding methods, border strip method, check basin and furrow method, assessment of irrigation water, sprinkler irrigation, favorable conditions, sprinkler systems, hydraulics of sprinkler irrigation, planning, design and maintenance of sprinkler systems, drip irrigation-components parts, advantages and limitations, suitability of drip irrigation.

UNIT-II
Canal irrigation: Classifications of canals, canal alignment, Inundation canals, Bandhara irrigation, advantages and disadvantages, Silt theories-Kennedy's theory, Lacey's theory, Drawbacks in Kennedy's & Lacey's theories, comparison of Lacey's and Kennedy's theories, Design of unlined canals based on Kennedy & Lacey's theories...

Lined canals: Types of lining, selection of type of lining, Economics of lining, maintenance of lined canals, silt removal, strengthening of channel banks, measurement of discharge in channels, design of lined canals, methods of providing drainage behind lining.

UNIT-III
Losses in canals, water logging and drainage: Losses in canals-Evaporation and seepage, water logging, causes and ill effects of water logging anti water logging measures. Drainage of land, classification of drains - surface and subsurface drains, Design considerations for surface drains, Advantages and maintenance of tile drains.

River Training work: Classification of rivers, river training and its objectives, classification of river training works, methods of river training, marginal embankments, guidebanks, spurs, cutoffs, bank pitching and launching apron.

UNIT-IV
Canal outlets: Classification, requirements of a good outlet, design of pipe, APM and open flume outlet, flexibility proportionality, setting and sensitivity of outlet.

Tube-well irrigation: Types of tube wells - strainer type, cavity type and slotted type. Type of strainers, Aquifer, porosity, uniformity coefficient, specific yield & specific retention, coefficients of permeability, transmissibility and storage. Yield or discharge of a tube well, Assumptions, Theim's & Dupuit's formulae, Limitations of Theim's and Dupuit's formulae. Interference of tube wells with canal or adjoining tube-wells, causes of failure of tubewells, optimum capacity, Duty and delta of a tube well. Rehabilitation of tubewell.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books:
1. Irrigation, Water Resources and Water Power Engg. by P.N.Modi.
5. Irrigation-Theory & Practice by A.M. Michael.
UNIT-I
Introduction to Disaster Management: Define and describe disaster, hazard, emergency, vulnerability, risk and disaster management; Identify and describe the types of natural and non-natural disasters. Important phases of Disaster Management Cycle.
Disaster Mitigation and Preparedness: Natural Hazards: causes, distribution pattern, consequences and mitigation measures for earthquake, tsunami, cyclone, flood, landslide drought etc. Man-made hazards: causes, consequences mitigation measures for various industrial hazards/disasters, Preparedness for natural disasters in urban areas.

UNIT-II
Hazard and Risk Assessment: Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems.

UNIT-III
Capacity Building: Gender sensitive disaster management approach and inculcate new skills and sharpen existing skills of government officials, voluntary activists, development of professional and elected representative for effective disaster management, role of media in effective disaster management, overview of disaster management in India, role of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines.
Application of Geo-informatics and Advanced Techniques: Use of Remote Sensing Systems (RSS) and GIS in disaster Management, role of knowledge based expert systems in hazard scenario, using risks-time charts to plan for the future, early warning systems.

UNIT-IV
Integration of public policy: Planning and design of infrastructure for disaster management, Community based approach in disaster management, methods for effective dissemination of information, ecological and sustainable development models for disaster management.
Case Studies: Lessons and experiences from various important disasters with specific reference to Civil Engineering.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books/References:
2. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester
3. Disaster Management, R.B. Singh (Ed), Rawat Publications
4. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction.
5. www.http//ndma,gov.in
Course Objective: To impart knowledge of earth soil and its structures and also the stability of earth structures.

UNIT | Course Outcome
--- | ---
I | Students will be able to study about earth dams and stability of slopes.
II | To study about braced cuts and coffer dams, their design and stability.
III | To study about stabilization of soil masses by using sheet piles.
IV | To study the methods of Soil Stabilization and machine tools

UNIT-I

Earth Dams: Introduction, types of sections, earth dam foundations, causes of failure and criteria for safe design, control of seepage through the embankment, control of seepage through the foundation, drainage of foundations, and criterion for filter design. Introduction to rock fill dams.


UNIT-II

Braced Cuts: Depth of unsupported vertical cut, sheeting and bracing for deep excavation, movements associated with sheeting and bracing, modes of failure of braced cuts, pressure distribution behind sheeting.

Cofferdams: Introduction, types of cofferdams, design and lateral stability of braced cofferdams, design data for Cellular cofferdams, stability analysis of cellular cofferdams on soil and rock, inter-lock stresses.

UNIT-III

Cantilever Sheet Piles: Purpose of sheet piles, cantilever sheet piles, depth of embedment in granular soils-rigorous method, simplified procedure, cantilever sheet pile, penetrating clay and limiting height of wall.

Anchored Bulkheads: Methods of design, free earth support method in cohesionless and cohesive soils, fixed earth support method in cohesionless soils-Blum's equivalent beam method.

UNIT-IV

Soil Stabilization: Soil improvement, shallow compaction, mechanical treatment, use of admixtures, lime stabilization, cement stabilization, lime fly ash stabilization, dynamic compaction and consolidation, bituminous stabilization, chemical stabilization, pre-compression, lime pile and column, stone column, grouting, reinforced earth.


Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books Recommended:
5. Foundation Design by Teng, Prentice Hall
UNIT-I


Highway Plans, Highway Alignment and Surveys: Main features of 20 years road development plans in India. Requirements of an ideal highway alignment. Factors affecting alignment. Surveys for highway alignment.

UNIT-II

Cross Section Elements and Sight Distance Considerations: Cross section elements: friction, carriageway, formation width, land width, camber, IRC recommended values. Types of terrain Design speed. Sight distance, stopping sight distance, overtaking sight distance, sight distance at intersections, head light sight distance, set back distance. Critical locations for sight distance.


UNIT-III


UNIT-IV


Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books:
Course Objective: The aim of study is the water requirement, quantity, its properties and its distribution.

UNIT I
Water Quantity:

UNIT II
Water Quality:

UNIT III
Water Treatment:
Objectives, treatment processes and their sequence in conventional treatment plant, sedimentation – plain and aided with coagulation. Types, features and design aspects. Mixing basins and Flocculation units. Filtration – mechanism involved, types of filters, slow and rapid sand filtration units (features and design aspects). Disinfection principles and aeration.

UNIT IV
Water Distribution:

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books:
LIST OF EXPERIMENTS
1. To determine the toughness of the aggregate by aggregate Impact Test.
2. To determine the hardness of the aggregate by Los-Angeles Abrasion Test.
3. To determine the hardness of the aggregate by Dorry's Abrasion Test on Aggregates.
4. To determine the hardness of the aggregate by Deval Attrition Test on Aggregates.
5. To determine the Crushing Strength Test on Aggregates.
6. To determine the grade and hardness of the bitumen by Penetration Test.
7. To determine the elastic property of the bitumen by Ductility Test.
8. To determine the grade and hardness of the bitumen by Viscosity Test.
9. To determine the Softening Point Test on Bitumen.
10. To determine the Flash and Fire Point Test on Bitumen.

LIST OF EXPERIMENTS
1. To determine the pH value of a given sample of water waste water.
2. To determine the turbidity in given water waste water sample.
3. To determine the acidity of given sample of water waste water.
4. To determine the alkalinity of given sample of water waste water.
5. To determine temporary and permanent hardness in a given water sample.
6. To determine the chlorine does required for a given water sample.
7. To determine total suspended, suspended, dissolved settable solids in a sewage sample.
8. To determine the chloride concentration in a given sample of waste water.
9. To determine the sulphate concentration in given water sample.
LIST OF EXPERIMENTS

PART-A

Detailed drawing of the following reinforced concrete structures:

1. Footings: Isolated footings, combined footings, rectangular, trapezoidal, strip, strap, raft footings
2. Domes: Spherical and conical domes.
4. RCC Flat slabs
5. Masonary columns, bearing walls, retaining walls.

PART-B

Detailed design and drawing of the following steel structures:

1. Columns, base plates and their foundations
2. Plate Girder (welded)
3. Gantry Girder
4. Simple roof trusses.
# Bachelor of Technology (Information Technology)

## Semester – V (w.e.f. Session 2017-18)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
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<td>IT-301N</td>
<td>Linux Operating System</td>
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<tr>
<td>2.</td>
<td>IT-303N</td>
<td>Introduction to Digital &amp; Data Communication</td>
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<td>3.</td>
<td>IT-305N</td>
<td>JAVA Programming</td>
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<td>IT-307N</td>
<td>Multimedia &amp; Virtual Reality</td>
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<td>5.</td>
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<td>6.</td>
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<td>7.</td>
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</table>

Note: Industrial Training which was undergone by the students after IV sem is to be evaluated during V sem as (IT-319N) through submission of certified computerized report to the Head of the Department followed by viva-voce, seminar/presentation.

## Semester – VI (w.e.f. Session 2017-18)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
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<td>P</td>
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<tr>
<td>1.</td>
<td>IT-302N</td>
<td>Analysis &amp; Design of Algorithms</td>
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<td>IT-304N</td>
<td>Software Engineering</td>
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<td>Computer Networks</td>
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<td>5.</td>
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<td>IT-318N</td>
<td>Microcontroller Lab</td>
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<td>IT-320N</td>
<td>Colloquium &amp; Professional Proficiency</td>
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</table>

Note: The students will have to undergo another six weeks Industrial Training after VI sem and it will be evaluated during VII sem through submission of certified computerized report to the Head of the Department followed by viva-voce, seminar/presentation.
Introduction: Basic concepts of the operating system. Commands, shells and processes; users and groups; file system and directories. System installation, configuration and upgrade Installation stages; network installation; disk partitioning; post-install system customization and upgrade; dpkg and APT package installation, remove, upgrade and query; semiautomatic system installation.

Kernel: Kernel tasks; managing kernel modules at runtime; kernel configuration and compilation boot loaders GRUB and LILO.

Unit-2

Linux Networking: Basic concepts of networking: Network packets, TCP/IP protocol suit, address resolution protocol (ARP); IP addresses and network mask; subnets and routing; IPv4 and Network classes; ports. Configuring Linux machine on the network; arp, ipconfig and netstat commands. Network services and tools; telnet, rsh, ftp, rcp, ssh, rsync, inetd.conf; opening and closing ports.

Network File system (NFS): File system sharing or the network; remote procedure call (RPC) services; NFS server and client sides; NFS installation & configuration; and statistic mount and auto mount configuration; when trouble shooting NFS; security and optimization.

Network information service (NIS): Centralized authentication systems; sharing user and host information or the network; IS server and client sides and configuration; compatibility mode; net group; security issues.

Unit-3

Integrating Linux and Windows: Elements of windows networking; Net BIOS SMB\ CIFS protocols; domain controller; Samba server on Linux for centralized window logon; file sharing and printing, samba client; samba installation and configuration; Unix and windows password. Dual Boot: running windows and Linux on the same PC; GRUB and NT Boot loaders; accessing windows files systems from Linux and vice versa.

Light Weight Directory Access Protocol (LDAP): Overview of Unix authentication and naming service; introduction to LDAP: Domain component (DC); organizational Unit (OU); common names (CN); Schemas; IDIF format; services; pools and commands; server and client sides; Open LDAP installation and configuration; LDAP applications. Shell scripting, syntax of bash; looping; case statement; function; command substitution; awk, grep, sed. Startup and Run Levels. Scheduled jobs. Boot up and login process sequence; run levels; startup scripts; scheduling jobs with at and cron.

Unit-4

Linux Security: System vulnerabilities; port scanning; encryption, encrypted services and connections; PGP/GPG Intrusion protection: tcp-wrappers, IP-firewalls (iptables), NAT and DMZ; Intrusion detection systems: tripwire; Secure system management practices.

Email Server: Steps of Email transaction; Email envelope and headers; SMTP servers; IMAP and POP3 servers; E-mail relay; Postfix configuration; Spam and viruses.

Domain Name Server (DNS): Host name resolution; domain name hierarchy; DNS zones; configuration of master, slave and caching DNS servers with BIND 9.

Text Books
2. Richard L. Peterson , Complete Reference, Red Hat Linux—TMH.
3. Tery Dawson, Gregor N. Purdy, Tony Bautts ; Linux N/W Administration Guide – OREILLY.

Reference Books
1. Christopher Negus , Red Hat Linux 9 Bible- WILEY publishing.
2. Patrick Volker Ding, Kevin Richard, Eric Foster-Johnson, Linux Configuration & Installation BPB publication.
3. John Goerzen, Linux Programming Bible -Wiley Dream Tech India (P) Ltd.

NOTE: Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
**Unit-1**

**Introduction**
What is communication, Elements of communication system, Signal, Concept of bandwidth, sources of signal, Types of communication channels, classification of electronic communication system, Modulation, Introduction to analog modulation system – AM, FM, PM; Elements of Digital communication system, Comparison of analog and digital modulation, advantages and disadvantages of digital communication, Limitations of communication system, Electromagnetic spectrum for communication

**Unit-2**

**Pulse Modulation:**
Sampling theorem, Nyquist rate, Introduction to PAM, PWM, PPM; Quantization, Introduction to PCM and delta modulation, Introduction to TDM and FDM

**Unit-3**

**Digital Modulation**
Line coding, introduction to Encoding schemes: RZ, NRZ; Modulation Techniques – ASK-FSK-PSK-QPSK

**Unit-4**

**Digital data Transmission**
Classification: Parallel, Serial, Asynchronous and synchronous transmission; Error Detection and correction techniques: Parity checks, Hamming code; DTE & DCE interface, Introduction to: a) RS-232C, b) RS-449, c) USB, d) HDMI.

**Text Books:**
2. Sanjay Sharma, “Digital communication”, S.K. Kataria and sons

**Reference Books:**
2. Stallings, “Data & computer Communications”, PHI.

**NOTE:** The course is introductory in nature. Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
IT-305 N  
JAVA Programming  

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Major Test</th>
<th>Minor Test</th>
<th>Total</th>
<th>Time</th>
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</thead>
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<tr>
<td>4</td>
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<td>-</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td>3(Hrs.)</td>
</tr>
</tbody>
</table>

Purpose  
To understand design and implementation of various software applications.

CO 1  
To study basic concept of OOP.

CO 2  
Learn about the interfaces, multithreading in JAVA.

CO 3  
To study database connectivity with JAVA.

CO 4  
To familiarize the student to server side programming.

Unit-1


Arrays and Strings: Arrays, Arrays of Characters, String handling Using String Class, Operations on String Handling Using, String Buffer Class.

Extending Class and Inheritance: Using Existing Classes, Class Inheritance, Choosing Base Class, Access Attributes, Polymorphism, Multiple Levels of Inheritance, Abstraction through Abstract Classes, Using Final Modifier, The Universal Super class-Object Class.

Unit-2
Package & Interfaces: Understanding Packages, Defining a Package, Packaging up your Classes, Adding Classes from a Package to your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Packages, Concept of Interface.

Exception Handling: The Idea behind Exceptions, Types of Exceptions, Dealing with Exceptions, Exception Objects, Defining Your Own Exceptions, Checked and Unchecked Exceptions.


Input/Output in Java: I/O Basic, Byte and Character Structure, I/O Classes, Reading Console Input, Writing to Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File. Stream Benefits.

Unit-3

Java Data Base Connectivity (JDBC): Database Connectivity- Relation Databases, JDBC API, Reusing Database Objects, Transactions, Advance Techniques.

Working with Windows: AWT Classes, Window Fundamentals, Working with Frame, Creating a Frame Window in an Applet, displaying information within a Window.

Unit-4

Java Servlet Programming: Role and Advantages of Java Servlets in Web application Development. HTTP Servlets- Introduction, page generation, server side includes, servlet chaining, java Server pages.

Server Life Cycle: Servlet Alternative, Reloading, Init and Destroy, Single Thread Model, Background Processing Last Modified times, synchronization, Persistent state capabilities.

Text Books / Reference:
2. Ivor Horton, Beginning JAVA 2 (JDK1.3 Edition), WROX Public.
5. JAVA 2 (1.3) API Documentations.

NOTE: Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
Multimedia & Virtual Reality

<table>
<thead>
<tr>
<th>IT-307 N</th>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Major Test</th>
<th>Minor Test</th>
<th>Total</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>To familiarize with different techniques and tools of multimedia applications.</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>75</td>
<td>25</td>
<td>100</td>
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<tr>
<td>CO 1</td>
<td>Introduction to basics of multimedia technologies.</td>
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<tr>
<td>CO 2</td>
<td>To study file system and information model of multimedia.</td>
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<tr>
<td>CO 3</td>
<td>To familiarize with the animation in multimedia.</td>
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<tr>
<td>CO 4</td>
<td>To study the virtual reality concepts.</td>
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</table>

**UNIT - 1**

**Basics of Multimedia Technology:** Computers, communication and entertainment, multimedia an introduction & emerging applications, framework for multimedia systems, multimedia devices, CD-AUDIO, CD-ROM, multimedia presentation tools.

**Audio, Video And Image:** Digital representation of sound, transmission of digital sound, MPEG-Audio, audio compression and decompression, brief survey of speech recognition and generation, musical instrument digital interface, evaluating a compression system-redundancy and visibility, video compression techniques, JPEG-image compression standards, MPEG-motion video compression standard-DVI Technology

**UNIT - 2**

**Multimedia File Systems and Information Models:** The case of multimedia information system, file support for continuous media-data models for multimedia and hyper media information, multimedia presentation and authoring, current state of industry-design paradigms and user interface-barriers to widespread use, multimedia system service architecture, media stream protocol and services and window system, client control of continuous media, file system support, hyper applications.

**UNIT - 3**

**Multimedia Communication Systems:** Multimedia services over the public network, requirements, architecture and protocols-applications-network services-network protocols-multimedia interchange: Quicktime movie file format(QMF)-MHEG(Multimedia and Hypermedia information and coding expert group)-format function and representation summary-real time interchange-Multimedia conferencing: teleconferencing systems.

**Animation:** Introduction, Basic terminology techniques, Motion graphics 2D & 3D animation. Introduction to MAYA (Animating tool): Fundamentals, Modeling: NURBS, Polygon, Organic, animation, paths & boxes, deformers, working with MEL: Basics & programming Rendering &special effects: shading & texturing surfaces lighting, special effects.

**UNIT - 4**

**Virtual Reality:** Introduction to Virtual Reality, Four key elements of virtual reality - a) virtual world, b) immersion, c) sensory feedback d) interactivity; Desktop virtual reality, VR operating system, virtual environment displays & orientation making; visually coupled system requirements; intelligent VR software systems.

**Text Books:**
3. John Villamil Louis Molina, Multimedia An Introduction PHI.
4. Jose Lozano, Multimedia: Sound & video, PHI(Que)

**Reference Books:**

**NOTE:** Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>IT-309 N</th>
<th>Computer Graphics</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>Tutorial</td>
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<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Purpose</td>
<td>To provide the conceptual knowledge of Computer Graphics.</td>
</tr>
<tr>
<td>CO 1</td>
<td>Introduction to different graphics algorithm.</td>
</tr>
<tr>
<td>CO 2</td>
<td>To acquaint with viewing system and clipping.</td>
</tr>
<tr>
<td>CO 3</td>
<td>To study different transformation techniques and projection of an object.</td>
</tr>
<tr>
<td>CO 4</td>
<td>To familiarize with 3D curves and surfaces.</td>
</tr>
</tbody>
</table>

**Unit – 1**


**Graphic devices:** Light pen, Mouse, Tablet, Touch panel, Digitizers

**Unit – 2**

**Two Dimensional Viewing:** Two dimensional geometric transformations, Viewing pipeline, Window to view port transformation, Window to view port mapping.

**Clipping:** Point & Line clipping algorithm, Cohen-Sutherland Line clipping algorithms, Polygon clipping: Sutherland-Hodgeman Polygon clipping algorithm. Curve clipping, Text clipping.

**Unit – 3**

**Three Dimensional Viewing:** Introduction to Three-dimensional display methods: Parallel & Perspective Projection, depth cueing, surface rendering; Three-Dimensional Geometric and Modeling Transformations; Viewing pipeline, Viewing coordinates..

**Unit – 4**

**Representation of 3-D Curves and Surfaces:** Curved lines and surfaces, spline representations, interpolation and approximation splines, Parametric continuity conditions, Geometric continuity conditions.

**Bezier curves and surfaces:** Bezier curves, properties of Bezier curves, Bezier surfaces, B-spline curves and surfaces.

**Hidden Surfaces removal:** Classification of Visible-Surface Detection algorithms, Hidden surface elimination, depth buffer algorithm, scan line coherence and area coherence algorithm, priority algorithm.

**Introduction to animation:** Design of Animation Sequences, General Computer-Animation Functions, Morphing

**Text Books**

**Reference Books**

**NOTE:** The course is introductory in nature. Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
List of experiments:

1. Write a program to implement DDA line drawing algorithm.
2. Write a program to implement Bresenham’s line drawing algorithm.
3. Implement the Bresenham’s circle drawing algorithm.
4. Write a program to implement the midpoint circle drawing algorithm.
5. Write a program to implement 2-D transformations.
6. Write a program to show a ball moving on the screen according to the given requirements.
7. Write a program to implement the midpoint circle drawing algorithm.
8. Write a program to implement the Beizer curve.
9. Implement the line clipping algorithm using C.
10. Implement boundary fill algorithm using C.
11. Implement the depth buffer algorithm using C.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.
List of experiments:

1. Create any two slides using power point
2. Create a website on any of your favorite topic.
3. Create a website of your college using HTML tags
4. Perform the following using Movie star:
   a) Video Capturing
   b) Video Editing and
   c) Creating Video CD.
5. Animate a ball using Flash
6. Using Adobe Deluxe Photoshop edit a digital photo by changing the background color, changing the theme, changing the part of the photo and editing the different parts of the photo.
7. Animate the following using GIF animator:
   a) Image
   b) Banner Text
8. Perform the following using Multimedia Software:
   a) Clip a portion of an audio wave file
   b) Add another audio file to the above clipped file
9. Perform the following using Multimedia software
   a) Extract audio from video file like .avi/.dat/.mpeg and save it in MP3
   b) Change the format of above audio file into midi/wav/asf/wm/cda

Note: A student has to perform 9 experiments. At least seven experiments should be performed from the above list. Two experiments may be designed & set by the concerned institution as per the scope of the syllabus.
List of experiments:

1. Write a program to illustrate the concept of simple and multilevel inheritance.
2. Write a program to illustrate the concept of “this” keyword.
3. Write a program to illustrate the concept of Constructor and method Overloading.
4. Write a program to draw a Pyramid in JAVA.
5. Write a program to implement Binary Search.
6. Write a program to illustrate the concept of Threads by using yield (), stop (), and sleep () methods.
7. Write a program to illustrates the concept of synchronization in Threads.
8. Write a program to illustrate the concept of applets.
9. Write a program to draw shapes using Graphics Methods
10. Write a program to read a record into database using JDBC Connectivity.
11. Write a program to illustrate the concept of Event Handling

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.
<table>
<thead>
<tr>
<th>Lecture</th>
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<th>Minor Test</th>
<th>Practical Exam</th>
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<th>Time</th>
</tr>
</thead>
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<td>--</td>
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<td>2</td>
<td>40</td>
<td>60</td>
<td>100</td>
<td>3(Hrs.)</td>
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</table>

**Purpose**
To introduce the student to Linux OS

**CO 1**
To explore basic commands of Linux.

**CO 2**
To study Linux networking and file system.

**CO 3**
To learn installation of server.

**CO 4**
To familiarize with administration of Linux operating system

**LIST OF EXPERIMENTS**

1. Install Linux on the system dual boot with the windows Operating System.
2. Do the following tasks :
   a) Create, remove & resize various types of partitions through GUI as well as command line.
   b) Configure printers in Linux through GUI as well as command line.
3. Creating, Removing of Swap space as well as swap files trough command line as well as GUI.
4. Implementation Disk Quotas- enabling, creating, mounting, configuring, assigning, disabling.
5. Managing Users and Groups in Linux- Adding, Modifying, Password aging.
7. Configuring NFS (Network File System) on Linux both GUI & Command Line.
8. Configuring Samba server on Linux both GUI & Command line.
9. Configuring D.N.S (Domain Name system) server on Linux both GUI & Command Line.
10. Configure an e-mail server in Linux-send mail.
11. Configuring Firewalls and managing various services of Linux.

**Note:** A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.
### Unit – 1

**Introduction:** Algorithm, Analyzing algorithm, Designing algorithm, Concept of algorithmic efficiency, Run time analysis of algorithms, Asymptotic Notations.

**Divide and conquer:** Structure of divide and conquer algorithms: examples; binary search, quick sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.

### Unit – 2

**Greedy Method:** Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), approximate solution (Knapsack problem), Singles source shortest paths.

**Dynamic programming:** Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Travelling salesman problem, longest common sequence.

### Unit – 3

**Back tracking:** Overview, 8-queen problem, and Knapsack problem

**Branch and bound:** LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem.

### Unit – 4

**Graph searching and Traversal:** Overview, Traversal methods (depth first and breadth first search).

**Trees:** Review of trees, Binary search tree, Traversal, Insertion & Deletion in Binary Search Tree, B-Trees, B+Trees, Basic operations on B Trees.

**Computational Complexity:** Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

**Text Book:**


**Reference Books:**


**NOTE:** Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
Software Engineering

<table>
<thead>
<tr>
<th>IT-304 N</th>
<th>Software Engineering</th>
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<tbody>
<tr>
<td>Lecture</td>
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<tr>
<td>Tutorial</td>
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<td>Practical</td>
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<td>Major Test</td>
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<td>Minor Test</td>
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<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>Time</td>
<td>3(Hrs.)</td>
</tr>
</tbody>
</table>

**Purpose**
To familiarize the students with the concept of designing the software.

**CO 1**
To study different software life cycle model.

**CO 2**
To acquaint with requirement analysis and designing phase of software development.

**CO 3**
To learn different testing and maintenance in software engineering

**CO 4**
To explore quality assurance and reliability of the software.

---

**Unit – 1**


Software project management: Project management concepts, software process and project metrics Project planning, project size estimation metrics, project estimation techniques, empirical estimation techniques, COCOMO, A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking.

---

**Unit – 2**

Requirements Analysis and specification: Requirements engineering, system modeling and simulation Analysis principles modeling, partitioning Software, prototyping, Prototyping methods and tools, Specification principles, Representation, the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling, The mechanics of structured analysis: Creating entity/relationship diagram, data flow model, control flow model, the control and process specification, The data dictionary, Other classical analysis methods.

System Design: Design concepts and principles: the design process: Design and software quality, design principles, Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure software procedure, information hiding, Effective modular design: Functional independence, Cohesion, Coupling, Design Heuristics for effective modularity; The design model; Design documentation. Architectural Design: Software architecture, Data Design: Data modeling, data structures, databases and the data warehouse, Analyzing alternative Architectural Designs, architectural complexity; Mapping requirements in to software architecture; Transform flow, Transaction flow; Transform mapping; Refining the architectural design.

---

**Unit – 3**

Testing and maintenance: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, Unit testing: white box testing, basic path testing: Control structure testing: Black box testing, testing for specialized environments, architectures and applications. Software Testing Strategies: Verification and validation, Integration testing, Validation testing, alpha and beta testing. System testing: Recovery testing, security testing, stress testing performance testing; The art of debugging process debugging approaches. Software re-engineering: Reverse engineering, restructuring, forward engineering.

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**Unit – 4**

Software Reliability and Quality Assurance: Quality concepts, Software quality assurance, SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability, The ISO 9000 Quality standards, SEI-CMM Capability Maturity Model.

Computer Aided Software Engineering: CASE, building blocks, integrated case environments and architecture, repository.

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**Text Books:**
2. Rajib Mall, *Fundamentals of software Engineering*, PHI

**Reference Books:**
3. Ali Behforooz and Frederick J. Hudson. *Software Engineering Fundamentals*, Oxford University,

**NOTE:** Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
IT-306 N

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**Purpose**
This course covers the concepts of computer networking and communication.

**CO 1**
Introduction to fundamental of networking model.

**CO 2**
To study different protocols used for transmitting data.

**CO 3**
To explore physical and data link layer of networking model.

**CO 4**
To study Network and transport layer of networking model.

## Unit – 1


**Basics terminology of Computer Networks:** Bandwidth, physical and logical topologies, media 10 base A, 10base 5, 10 base 5, 10base-T, 100 base FX, 100base LX and wireless.

LAN & WAN devices – Router, Bridge Ethernet switch HUB, Modem SCU/DSU.

**OSI Reference Model:**
Laying architecture of networks, OSI model, Functions of each layer, Services and Protocols of each Layer.

## Unit – 2


OSI and TCP/IP model with description of data encapsulation & peer to peer communication, comparison of OSI and wireless.

## Unit – 3

**Physical Layer:** Representation of a bit on physical modem that is in wired network, optical network and wireless network. Encoding/Modulation – TTL, Manchester Encoding, AM, FM and PM. Dispersion, Jitter, Latency and Collision. Different types of media-twisted pair, unshielded twisted pair, coaxial cable, optical Fiber cable and wireless.

**Data Link Layer:** LLC and MAC sub layer, MAC addressing layer 2 devices, framing error control and flow control. Error detection & correction CRC, block codes parity and checksum, elementary data link protocol, sliding window protocol, channel allocation problem-static and dynamic, Multiple Access protocol- ALOHA, CSMA/CU, Token bus, token ring, FDDI.

## Unit – 4

**Network Layer:** Segmentations and autonomous system path determination, network layer addressing, network layer data gram, IP addressed Classes. Sub netting – Sun network, Subnet Mask, Routing algorithm-optionally principle, Shortest path routing, hierarchical routing, Broadcast routing, Multicast routing, routing for mobile host – tunneling, fragmentation and DHCP, Routing protocol- RIP, IGRP, USPF and EIGRP.

**Transport Layer:** TCP & UDP. Three way handshaking. ATM AAL layer protocol.

## Text Book:
1. Tanenbaum. “Computer Networks”, PHI

## Reference Books:
3. Halsall Fred, Data Communications, Computer Networks & open systems Addison Wesley
4. Fitzgerald Jerry, Business data communications,
5. Larry L. Peterson & Bruce S. Davie Computer Networks – A system approach, , 2nd Ed TMH.

**NOTE:** Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
Introduction to Microcontroller

UNIT-1

Introduction: - Evaluation of Microcontrollers; Classification of Microcontroller; Comparison between Microprocessor and Microcontrollers; Overview of 8051 microcontroller family. Block Diagram, Architecture and pin description of 8051. ; Types of Registers and flags of 8051.

UNIT-2

Introduction to programming of Microcontroller: - 8051 Instruction Format, Addressing modes, Data transfer instructions; Logical operations, Arithmetic operations, looping, jump and call instructions, Programming in C.

UNIT-3

Timer Programming and interrupts :- 8051 timer Programming ; 8051 Serial port programming; 8051 interrupt programming; External memory interfacing.

UNIT-4

Interfacing of microcontroller :- LCD , Keyboard interfacing ; A/D , D/A and sensor interfacing; Microcontroller interfacing with a) Relays b) opto-isolators , c) stepper motor d) DC motor

Text Books

Reference Books

Note: The course is introductory in nature. Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
UNIT-1

UNIT-2
Unlocking the Data Asset for end users (The use of Business Information): Designing business information warehouse, populating business information warehouse, user access to information, information data in context. Implementing the Warehouse (Managing the project and environment): Obstacles to implementation, planning your implementation, justifying the warehouse, organizational implications of data Warehousing, the data warehouse in your organization, data warehouse management, looking to the future.

UNIT-3
Introduction of Data Mining: Motivation, importance, data mining, kind of data, functionalities, interesting patterns, classification of data mining system, major issues. Data warehouse and OLAP technology for data mining: data warehouse, operational database systems and data warehouse architecture, implementation, development of data cube technology, data warehousing to data mining, data warehouse usage.

UNIT-4
Data Preparation: Preprocess data cleaning, data integration and transformation, data reduction, discrimination and concept hierarchy generation. Data Mining Primitives, languages and system architectures, graphical user interfaces. Concept Description: Characterization and comparison data generalization and summarization based characterization, analytical characterization, and analysis of attribute relevance, mining class comparison, and mining descriptive statistical measures in large databases. Mining association rules in large databases, mining single dimensional Boolean association rules from transactional databases, mining multi-dimensional association rules from relational databases and data warehouses, from association to correlation analysis, constraint based association.

Text Books
1. J. Han & M. Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann/Elsevier, India, 2001

Reference books

NOTE: Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.
### LIST OF EXPERIMENTS

1. Study and categorize the generic phases of software development and maintenance.
2. Study various software development models.
3. Study various types of feasibility study and steps in doing feasibility study.
4. Study various steps for doing the requirement analysis of any project.
5. Write algorithm and draw flow chart to implement the constructive cost estimation model (COCOMO).
6. Making use of Graphical Design notation, study the concept in developing data flow diagram (DFD) for any selected project.
7. Making use of object oriented design, implement a student & employee record system using the concept of inheritance.
8. Select an appropriate programming language & translate the detailed design made in experiment 7 in appropriate programming language.
10. Apply the debugging process to the project selected in exp-9 in accordance with the result generated from its testing in exp-9.
11. Study various concepts involved in cost / benefit analysis.
12. Draw flow chart and write algorithm for designing an editor.

**Note:** A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.
## IT-314 Networking Lab

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**Purpose**: This course covers the concepts of computer networking and communication.

**Purpose**: To learn the basic concept and networking model.

**Purpose**: To study different protocols used for transmitting data.

**Purpose**: To study physical and data link layer of networking model.

**Purpose**: To study Network and transport layer of networking model.

### LIST OF EXPERIMENTS

1. Study the physical media of connectivity.
2. Study the pin-structure of cross-over cable.
3. Study the different LAN Technologies.
4. Study the functioning of a Switch.
5. Study the Functioning of a Router.
6. Establishing LAN (Star topology) for your LAB using Hubs (18 ports, 16 ports).
7. Study and install the media converting using optical fiber.
8. Install and configure the LAN card.
9. Install and configure window 200 Server.
10. Study and implement the virtual network.

**Note**: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.
IT-316 N  Visual Basic.net Lab

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**Purpose**: This course covers the concepts of .net programming.

**CO 1**: To learn the basic concept of GUI

**CO 2**: To study SMTP

**CO 3**: To study encryption and decryption

**CO 4**: To study how to create drawing application in VB.Net

**LIST OF EXPERIMENTS**

1. Create a calculator that can be used for adding, subtracting, multiplication and division.
2. Write an application to use WMI to retrieve information about your PC.
3. Write an application to create a File and Folder browser.
4. Write a program in VB.NET to send an email via SMTP.
5. Write a program to create a MDI web browser.
6. Write an application to access registry in VB.NET.
7. Write a program to retrieve a web page source from the Internet.
8. Create a slot machine game using standard controls and random number generator.
9. Write a program to create a word processor.
10. Write a program for encryption and decryption.
11. Write an application to capture screen.
12. Create a drawing application in VB.NET.
13. Write an application in VB.NET to play MP#3 files.

**Note**: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.
### Purpose
To train the student on how to use Microcontroller.

**CO 1** To introduce the student to Microcontroller programming
**CO 2** To control LCD module.
**CO 3** Use of microcontroller in controlling stepper motor
**CO 4** Practical approach in interfacing of microcontrollers with different devices.

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### LIST OF EXPERIMENTS

1. Introduction to microcontroller trainer and interfacing modules.
2. To display the digital output of ADC on 16*2 LCD Module.
3. To display character ‘A’ on 8*8 LED Matrix.
4. To display the data and time on LCD Module
5. To interface the seven segment display with microcontroller 8051.
6. To create a series of moving lights using 8051 on LEDs.
7. To interface the stepper motor with microcontroller.
8. To switch on and off relay by using keys.
9. To interface the DC motor using H-Bridge.
10. To interface a keypad with microcontroller.

**Note:** A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.
Purpose
To enhance holistic view of students so as to improve their employability skills.

CO 1
To develop interpersonal skills and be an effective goal oriented team player.

CO 2
To develop communication and problem solving skills.

CO 3
To develop aptitude

CO 4
To enhance general knowledge of students in various domains of life.

A practical and activity oriented course with continuous assessment for 100 marks.

The course will comprise of:
a) Class room interaction and activities: Technical Quiz, aptitude tests, extempore speech, general knowledge test etc.
b) Seminars
c) Presentation

The student will submit a course report comprising of credits / results based on the above.