

UTTAR PRADESH TEXTILE TECHNOLOGY INSTITUTE, KANPUR
AFFILIATED TO DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY LUCKNOW

Programming for Problem Solving

KCS-101/201

Revised w.e.f. Session 2018-19

LTP: 3-1-2, CREDIT:5

Module	Topics	Lectures
1	<p>Introduction to Programming:</p> <p>Introduction to components of a computer system: Memory, processor, I/O Devices, storage, operating system, Concept of assembler, compiler, interpreter, loader and linker.</p> <p>Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo code with examples, From algorithms to programs, source code.</p> <p>Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object and executable code. Components of C language. Standard I/O in C, Fundamental data types, Variables and memory locations, Storage classes.</p>	08
2	<p>Arithmetic expressions & Conditional Branching:</p> <p>Arithmetic expressions and precedence: Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associativity.</p> <p>Conditional Branching: Applying if and switch statements, nesting if and else, use of break and default with switch</p>	08
3	<p>Loops & Functions:</p> <p>Iteration and loops: use of while, do while and for loops, multiple loop variables, use of break and continue statements.</p> <p>Functions: Introduction, types of functions, functions with array, passing parameters to functions, call by value, call by reference, recursive functions</p>	08
4	<p>Arrays & Basic Algorithms:</p> <p>Arrays: Array notation and representation, manipulating array</p>	08

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	<p>elements, using multi dimensional arrays. Character arrays and strings, Structure, union, enumerated data types, Array of structures, Passing arrays to functions.</p> <p>Basic Algorithms: Searching & Basic Sorting Algorithms (Bubble, Insertion and Selection),</p> <p>Finding roots of equations, Notion of order of complexity.</p>	
5	<p>Pointer & File Handling:</p> <p>Pointers: Introduction, declaration, applications, Introduction to dynamic memory allocation (malloc, calloc, realloc, free), Use of pointers in self-referential structures, notion of linked list (no implementation)</p> <p>File handling: File I/O functions, Standard C preprocessors, defining and calling macros, command-line arguments.</p>	08

COURSE OUTCOMES

1. To develop simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs & execution (in C language).
3. To implement conditional branching, iteration and recursion.
4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
5. To use arrays, pointers and structures to develop algorithms and programs.

Text books:

1. Schum's Outline of Programming with C by Byron Gottfried, McGraw-Hill
2. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education.
3. Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited, 2015.
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
5. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition , Cengage Learning - 2007.
6. Let Us C By Yashwant P. Kanetkar.

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7. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
8. Programming in C by Kochan Stephen G. Pearson Education – 2015.
9. Computer Concepts and Programming in C by D.S. Yadav and Rajeev Khanna, New Age International Publication.
10. Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication.
11. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication
12. Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication

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Programming for Problem Solving Lab
KCS-151/251
Revised w.e.f. Session 2018-19

Note: Solve any 15 problems.

- 1.WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
- 2.WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.
- 3.WAP to calculate the area and circumference of a circle.
- 4.WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula $C/5=(F-32)/9$.
- 5.WAP that swaps values of two variables using a third variable.
- 6.WAP that checks whether the two numbers entered by the user are equal or not.
- 7.WAP to find the greatest of three numbers.
- 8.WAP that finds whether a given number is even or odd.
- 9.WAP that tells whether a given year is a leap year or not.
10. WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:
Between 90-100%-----
-Print 'A' 80-90%-----
-----Print 'B' 60-
80%-----
Print 'C' Below 60%-----
-----Print 'D'
11. WAP that takes two operands and one operator from the user and perform the operation and prints the result by using Switch statement.
12. WAP to print the sum of all numbers up to a given number.
13. WAP to find the factorial of a given number.
14. WAP to print sum of even and odd numbers from 1 to N numbers.
15. WAP to print the Fibonacci series.
16. WAP to check whether the entered number is prime or not.

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17. WAP to find the sum of digits of the entered number.
18. WAP to find the reverse of a number.
19. WAP to print Armstrong numbers from 1 to 100.
20. WAP to convert binary number into decimal number and vice versa.
21. WAP that simply takes elements of the array from the user and finds the sum of these elements.
22. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.
23. WAP to find the minimum and maximum element of the array.

24. WAP to search an element in an array using Linear Search.
25. WAP to sort the elements of the array in ascending order using Bubble Sort technique.
26. WAP to add and multiply two matrices of order $n \times n$.
27. WAP that finds the sum of diagonal elements of a $m \times n$ matrix.
28. WAP to implement `strlen()`, `strcat()`, `strcpy()` using the concept of Functions.
29. Define a structure data type `TRAIN_INFO`. The type contains Train No.: integer type Train name: string Departure Time: aggregate type TIME Arrival Time: aggregate type TIME Start station: string End station: string The structure type Time contains two integer members: hour and minute. Maintain a train timetable and implement the following operations:
 - (i) List all the trains (sorted according to train number) that depart from a particular section.
 - (ii) List all the trains that depart from a particular station at a particular time.
 - (iii) List all the trains that depart from a particular station within the next one hour of a given time.
 - (iv) List all the trains between a pair of start station and end station.
30. WAP to swap two elements using the concept of pointers.
31. WAP to compare the contents of two files and determine whether they are same or not.
32. WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

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COURSE OUTCOMES:

1. To write programs for arithmetic and logical problems.
2. To translate the algorithms to programs & execution (in C language).
3. To write programs for conditional branching, iteration and recursion.
4. To write programs using functions and synthesize a complete program using divide and conquer approach.
5. Write programs using arrays, pointers and structures.

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AUC-002:
CYBER SECURITY

UNIT-1

Introduction to information systems, Types of information Systems, Development of Information

Systems, Introduction to information security, Need for Information security, Threats to Information

Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

UNIT-2

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival

Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access

Control.

Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce-

Electronic Payment System, e• Cash, Credit/Debit Cards. Digital Signature, public Key Cryptography.

UNIT-3

Developing Secure Information Systems, Application Development Security, Information Security

Governance & Risk Management, Security Architecture & Design

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Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV and intrusion Detection Systems, Backup Security Measures.

UNIT-4

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy

Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies.

Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT

Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

References :

1. Charles P. Pfleeger, Shari Lawerance Pfleeger, "Analysing Computer Security", Pearson Education India.
2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
3. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla, "Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill.
5. CHANDER, HARISH, " Cyber Laws And It Protection ", PHI Learning Private Limited ,Delhi ,India

Course outcome:

1. Understand information, information systems, information security, Cyber Security and Security Risk Analysis (Understand)

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2. Understand and apply application security, data security, security technology, security threats from malicious software. (Understand, Apply)
3. Understand the concepts of security threats to e-commerce applications such as electronic payment system, e-Cash, Credit/Debit Cards etc. (Understand)
4. Understand and apply Information Security Governance & Risk Management, Security of IT Assets and Intrusion Detection Systems. (Understand, Apply)
5. Understand various types of Security Policies, Cyber Ethics, IT Act, IPR and Cyber Laws in India. (Understand)

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BASIC ELECTRICAL ENGINEERING (KEE101/201)
Revised w. e. f. Session 2018-19
LTP:3-1-2, Credit:5

Module	Topics	Lectures
1	<p>DC Circuits: Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, Kirchhoff's laws, Loop and nodal methods of analysis, Star-delta transformation, Superposition theorem, Thevenin theorem, Norton theorem</p>	08
2	<p>Steady- State Analysis of Single Phase AC Circuits: Representation of Sinusoidal waveforms – Average and effective values, Form and peak factors, Concept of phasors, phasor representation of sinusoidally varying voltage and current.</p> <p>Analysis of single phase AC Circuits consisting of R, L, C, RL, RC, RLC combinations (Series and Parallel), Apparent, active & reactive power, Power factor, power factor improvement. Concept of Resonance in series & parallel circuits, bandwidth and quality factor</p> <p>Three phase balanced circuits, voltage and current relations in star and delta connections</p>	10
3	<p>Transformers and Electrostatics: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections</p>	08
4	<p>Electromagnetics: DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems)</p> <p>Three Phase Induction Motor: Principle & Construction, Types, Slip-torque characteristics, Applications (Numerical problems related to slip only)</p> <p>Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.</p> <p>Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications introduction</p>	08

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	to special electrical machines (Universal motor, servo motor, stepper motors)	
5	Electrical Operations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance of earthing. Types of Batteries, Important characteristics for Batteries. Elementary calculations for energy consumption and savings, battery backup introduction to tariff, types of lamp (CFL, LED etc) impact on environment and energy saving.	06

COURSE OUTCOMES

CO1	Apply the concepts of KVL/KCL and network theorems in solving DC circuits.
CO2	Analyze the steady state behavior of single phase and three phase AC electrical circuits
CO3	Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency and identify the connections of a three phase transformer.
CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications
CO5	Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

Spoken Tutorial (MOOCs):

1. AC DC Circuit Analysis using NgSpice, Open Source Software (<http://spoken-tutorial.org>)

Text Books:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill.

Reference Books:

1. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
2. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press.
3. V. D. Toro, “Electrical Engineering Fundamentals”, Pearson India.

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4. Ritu Sahdev, "Basic Electrical Engineering", Khanna Publishing House.
5. S. Singh, P.V. Prasad, "Electrical Engineering: Concepts and Applications" Cengage.
6. Bird J., electrical circuit theory and technology, Routledge, Taylor & Francis Group.
7. H. Mehta VK and Mehta R, Basic Electrical Engineering, S. Chand Publication.
8. Suresh Kumar K.S, Electric circuit and network, Pearson Education

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ELECTRICAL ENGINEERING LABORATORY

KEE-151/251

LIST OF EXPERIMENTS

Note: A minimum of ten experiments from the following should be performed.

1. Verification of Kirchhoff's laws
2. Verification of Superposition and Thevenin Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Connection and measurement of power consumption of a fluorescent lamp (tube light).
6. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.
7. Determination of parameters of ac single phase series RLC circuit
8. To observe the B-H loop of a ferromagnetic material in CRO.
9. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer
10. Determination of efficiency of a dc shunt motor by load test
11. To study running and speed reversal of a three phase induction motor and record speed in both directions.
12. Demonstration of cut-out sections of machines: dc machine, three phase induction machine, single-phase induction machine and synchronous machine.

COURSE OUTCOMES

CO1	Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits
CO2	Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
CO3	Perform experiment illustrating BH curve of magnetic materials.

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CO4	Calculate efficiency of a single phase transformer and DC machine.
CO5	Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction.

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Instrumentation & Automatic Control

REC-102

LTP310- Credit:

Unit	Topics	Lectures
I	The principle of measurement, Understanding of static and dynamic measurement, Functional elements for measuring systems. Principle and operation of Transducers, Principles and operation of amplifier Basic Recording systems.	10
II	Instrumentation for measurement of motion, Strain force, torque, temperature, pressure, flow, surface, texture etc., design consideration in optical Instruments Design of mechanical and electrical instruments.	10
III	Numerical control basic concepts, point to point systems, Examples straight line and controlling system, examples Programme control-electrical and magnetic, Tape control, optical and mechanical methods. Introduction to micro processor, micro controller, PLC, SCADA, Embedded control, DCS.	10
IV	Numerical control components, manual part programming, computer aided programming, C.N.C., D.N.C.	8

Text Books:

1. Industrial instruments & control-S.K.Singh
2. Mechanical measurements-B.S.Sirohi & H.C.
3. Computer control of manufacturing-Yoren Koren.

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Engineering Graphics & Design

KCE-101/201

Revised w.e.f. Session 2018-19

LTP:1-0-4, CREDIT:3

Unit	Topics	Lectures
1	Introduction to Engineering Drawing, Orthographic Projections: Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering, Scales – Plain and Diagonal Scales Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes.	08
2	Projections and Sections of Regular solid: Sections inclined to both the Planes: Auxiliary Views, simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone.	08
3	Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.	08
4	Computer Graphics: listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects, Isometric Views of lines, Planes, Simple and compound Solids]; Set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints,	08

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	<p>Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles; Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;</p>	
5	<p>Demonstration of a simple team design project: Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids, meshed topologies for engineering analysis and tool-path generation for component manufacture, geometric dimensioning and tolerancing, Use of solid-modeling software for creating associative models at the component and assembly levels, floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice, Drawing sectional elevation showing foundation to ceiling, Introduction to Building Information Modelling (BIM).</p>	08

Course Outcomes:

- 1: Understanding of the visual aspects of engineering design
- 2: Understanding of engineering graphics standards and solid modelling
- 3: Effective communication through graphics
- 4: Applying modern engineering tools necessary for engineering practice
- 5: Applying computer-aided geometric design

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6: Analysis of Isometric views

7: Creating working drawings

Suggested Text/ Reference Books:

- (i) Bhatt N.D., Panchal V.M. & Ingle P.R. (2014), Engineering Drawing, Charotar Publishing House.
- (ii) Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
- (iii) Agrawal B. & Agrawal C.M. (2012), Engineering Graphics, TMH Publication
- (iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
- (v) (Corresponding set of) CAD Software Theory and User Manu

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WORKSHOP PRACTICE

KWS-101/201

Revised w.e.f. Session 2018-19

LTP:1-0-4, CREDIT:3

LIST OF EXPERIMENTS

Machine shop:

- Study of machine tools in particular Lathe machine
- Demonstration of different operations on Lathe machine
- Practice of Facing, Plane Turning, step turning, taper turning, knurling and parting.
Study of Quick return mechanism of Shaper.

Fitting shop:

- Preparation of T-Shape Work piece as per the given specifications.
- Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.
- Practice marking operations.

Carpentry Shop:

- Study of Carpentry Tools, Equipment and different joints.
- Practice of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Joint

Electrical & Electronics:

- Introduction to House wiring, different types of cables. Types of power supply, types of motors, Starters, distribution of power supply, types of bulbs, parts of tube light, Electrical wiring symbols.

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- Soldering and desoldering of Resistor in PCB.
- Soldering and desoldering of IC in PCB.
- Soldering and desoldering of Capacitor in PCB

Welding Shop:

- Instruction of BI standards and reading of welding drawings.
- Butt Joint
- Lap Joint
- TIG Welding
- MIG Welding

Casting:

- Introduction to casting processes

Smithy Shop:

- Sharpening any arc and edge.
- Preparing small arc and edge,
- Repair of agricultural implements and power plough, use of power hammer etc.

Plastic Moulding & Glass Cutting:

- Introduction to Patterns, pattern allowances, ingredients of moulding sand and melting furnaces. Foundry tools and their purposes
- Demo of mould preparation
- Practice – Preparation of mould
- Glass cutting

COURSE OUTCOMES

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding

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3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping
4. Welding and soldering operations
5. Apply basic electrical engineering knowledge for house wiring practice

Text Books:

1. Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
4. Jeyapoovan T. and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub. 2008.

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Department of Engineering
Mechanism of Machines
LTP: 310, CREDIT: 4

Unit	Topics	Lectures
1.	<p>Introduction : Rigid body, Mechanism and Machine, Kinematic Link, Kinematic Pair, Degrees of Freedom, Classification, Kinematic Chain, Linkage, Mechanism and Structure, Gruebler's Criterion for degrees of freedom.</p> <p>Inversions of mechanism: Four Bar Chain mechanism, Slider- Crank mechanism, Kinematic inversions, Double slider-crank mechanism, Inversions.</p>	8
2.	<p>Velocity Analysis: Instantaneous centre method, Kennedy's theorem, Locating instantaneous centres, Relative velocity method for slider-crank mechanism, and crank and slotted lever mechanism.</p> <p>Acceleration Analysis : Klein's construction, slider crank mechanism, Coriolis acceleration component, Crank and slotted lever mechanism</p>	8
3.	<p>Cam & Follower : Definition of cam, Classification of cams, Followers and their classification, Brief description of different types of cams and followers with simple line diagram, Simple cam profile for uniform velocity, SHM and uniform acceleration and deceleration with Flat, knife edge and roller type follower.</p> <p>Flywheel: Functions of flywheel, Kinetic Energy of rotating masses, turning moment diagram, Types of flywheels, Co-efficient of energy & speed.</p>	8
4.	<p>Gears & Gear Trains: Classification of gears, Law of gearing, forms of teeth, Path of contact, Arc of contact, Interference in involute gears, Minimum number of teeth, undercutting, Differential gears, Simple gear train, Compound gear train, Reverted gear train, epicyclic gear train. Sun and planet gears.</p> <p>Belt & Chain drives: Open and cross belt drives, Action of belts on pulleys, velocity ratio, slip, crowing of pulleys, power transmitted by belt drives.</p>	9
5.	<p>Vibrations: Types of vibrations, Free longitudinal vibrations, Damped vibrations, Logarithmic decrement, Forced vibrations, Forced Damped vibrations, Vibration isolation and transmissibility, Torsional vibrations.</p> <p>Balancing: Static balancing, Dynamic balancing, Balancing of masses in different planes, Balancing of reciprocating masses.</p>	9

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Course Outcomes: At the end of this course, student will be able to

CO1	Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms.
CO2	Analyze the planar mechanisms for position, velocity and acceleration.
CO3	Evaluate gear tooth geometry and select appropriate gears for the required applications.
CO4	Design cams and followers for specified motion profiles, Characterize and design flywheels.
CO5	Understand free and forced vibrations of single degree freedom.
CO6	Analyze balancing problems in rotating and reciprocating machinery.

Text Books:

1. Theory of Mechanisms and Machines by Ghosh and Malik.
2. Theory of Machines by S.S. Rattan.
3. Textile mechanism in spinning and weaving machines by Ganapathy Nagarajan

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Department of Engineering
Mechanical Machine Design

LTP: 310 CREDITS: 4

Unit	Topics	Lectures
I	<p>Introduction</p> <p>Definition, Design requirements of machine elements, Design procedure, Standards in design, Selection of preferred sizes, Indian Standards designation of carbon & alloy steels, Selection of materials for static and fatigue loads.</p> <p>Design for Static Load: Modes of failure, Factor of safety, Principal stresses, Stresses due to bending and torsion, Theory of failure.</p>	8
II	<p>Design for Fluctuating Loads: Cyclic stresses, Fatigue and endurance limit, Stress concentration factor, Stress concentration factor for various machine parts, Notch sensitivity, Design for finite and infinite life, Soderberg, Goodman & Gerber criteria.</p> <p>Riveted Joints: Riveting methods, materials, Types of rivet heads, Types of riveted joints, Caulking and Fullering, Failure of riveted joint, Efficiency of riveted joint, Design of boiler joints, Eccentric loaded riveted joint.</p>	8
III	<p>Shafts: Cause of failure in shafts, Materials for shaft, Stresses in shafts, Design of shafts subjected to twisting moment, bending moment and combined twisting and bending moments, Shafts subjected to fatigue loads, Design for rigidity.</p> <p>Keys and Couplings: Types of keys, splines, Selection of square & flat keys, Strength of sunk key, Couplings, Design of rigid and flexible couplings.</p>	8
IV	<p>Belt rope and chain drives: Design of belt drives, Flat & V-belt drives, Condition for Transmission of max. Power, Selection of belt, design of rope drives, and design of chain drives with sprockets</p> <p>Clutches: Various types of clutches in use, Design of friction clutches – Disc, Multidisc, Cone and Centrifugal.</p> <p>Brakes: Various types of Brakes, Design of shoe brakes – Internal & external expanding, band brakes.</p>	9
V	<p>Spur Gears</p> <p>Tooth forms, System of gear teeth, contact ratio, Standard proportions of gear systems, Interference in involute gears, Backlash, Selection of gear materials, Gear manufacturing methods, Design considerations, Beam strength of gear</p>	9

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	<p>tooth, Dynamic tooth load, Wear strength of gear tooth, Failure of gear tooth, Design of spur gears, AGMA and Indian standards.</p> <p>Helical Gears</p> <p>Terminology, Proportions for helical gears, Forces components on a tooth of helical gear, Virtual number of teeth, Beam strength& wear strength of helical gears, Dynamic load on helical gears, Design of helical gears.</p>	
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Text Books

1. Design of Machine Elements – V.B. Bhandari – Tata McGraw Hill, New Delhi.
2. Design of machine elements-C S Sharma, Kamlesh Purohit, PHI.

ReferenceBooks :

1. Product Design and Manufacturing , A.K.Chitale and R.C.Gupta, PHI.
2. Machine Design An Integrated Approach: Robert L.Norton, Addison Wesley.
3. Machine Design : S.G. Kulkarni - Tata MacGraw Hill.
4. Mechanical Engg. Design - First Metric Editions: Joseph Edward Shigley-MGH, New York.
5. Shigley's Mechanical Engineering Design- Tata MacGraw Hill.