DGCT AUTONOMOUS REGULATIONS – 2024

III SEMESTER

24TMA301	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis this is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier, transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT - I PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation of partial differential equations –Solutions of standard types of first order partial differential equations - First order partial differential equations reducible to standard types- Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT - II FOURIER SERIES 9+3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series and cosine series – Root mean square value – Parseval's identity – Harmonic analysis.

UNIT - III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3

Classification of PDE – Method of separation of variables - Fourier series solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Cartesian coordinates only)

UNIT - IV FOURIER TRANSFORMS 9+3

Statement of Fourier integral theorem– Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity

UNIT - V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 9+3

Z-transforms - Elementary properties – Convergence of Z-transforms - – Initial and final value theorems - Inverse Z-transform using partial fraction and convolution theorem - Formation of difference equations – Solution of difference equations using Z - transforms

TOTAL PERIODS : 60

COURSE OUTCOMES: At the end of the course, learners will be able to

CO1 - Understand how to solve the given standard partial differential equations.

CO2 - Solve differential equations using Fourier series analysis which plays a vital role in Engineering applications.

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CO3 - Appreciate the physical significance of Fourier series techniques in solving one- and two dimensional heat flow problems and one-dimensional wave equations.

CO4 - Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

CO5 - Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2018.
2. Kreyszig E, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, New Delhi, India, 2018.

REFERENCE BOOKS:

1. Andrews. L.C and Shivamoggi. B, "Integral Transforms for Engineers" SPIE Press, 1999.
2. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 10th Edition, Laxmi Publications Pvt. Ltd, 2021.
3. James. G., "Advanced Modern Engineering Mathematics", 4thEdition, Pearson Education, New Delhi, 2016.
4. Narayanan. S., ManicavachagomPillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2018.
6. Wylie. R.C. and Barrett. L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

CO's, PO's & PSO's MAPPING

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	1	-	-	-	-	2	-	-	3	-	-	-
CO2	3	3	1	1	-	-	-	-	2	-	-	3	-	-	-
CO3	3	3	1	1	-	-	-	-	2	-	-	3	-	-	-
CO4	3	3	1	1	-	-	-	-	2	-	-	3	-	-	-
CO5	3	3	1	1	-	-	-	-	2	-	-	3	-	-	-
Avg.	3	3	1	1	-	-	-	-	2	-	-	3	-	-	-

1- Low, 2- Medium, 3- High, "-" No Correlation

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DGCT AUTONOMOUS REGULATIONS – 2024

III SEMESTER

24TRA301	INTRODUCTION TO MECHANICAL SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of mechanics and to solve problems of equilibrium of a Particle in Space.
- To understand the concept of equilibrium and to solve problems of rigid bodies.
- To learn about the center of gravity and moment of inertia of surfaces and solids.
- To learn the concepts in kinematics and kinetics of rigid bodies in plane motion.
- To know the types of robotics.

UNIT - I STATICS OF PARTICLES 9

Introduction to Mechanics, Units and Dimensions, Force on a Particle, Resultant of Two Forces, Equilibrium of a Particle, Free body diagram, Newton's First Law of Motion, Equilibrium of a Particle in Space.

UNIT - II EQUILIBRIUM OF RIGID BODIES 9

Introduction, External and Internal Forces, Principle of Transmissibility, Moment of a Force about a Point, Varignon's Theorem, Reactions at Supports and Connections for a Two-dimensional Structure, Equilibrium of a Rigid Body in Two Dimensions, Statically Indeterminate Reactions, Equilibrium of Rigid bodies in two dimensions.

UNIT - III CENTER OF GRAVITY AND MOMENT OF INERTIA 9

First and second moment of area and mass, radius of gyration, parallel axis theorem, perpendicular axis theorem, product of inertia. Problems- T section, I section, rectangular section, circular section.

UNIT - IV DYNAMICS 9

. Introduction to Dynamics, Rectilinear and Projectile Motion of particles, Kinetics of particle - Newton's Second Law of Motion and work - Energy Equations, Introduction to Kinematics of Rigid Bodies-Translation, Rotation about a Fixed Axis, Equations Defining the Rotation of a Rigid Body about a Fixed Axis, General Plane Motion-Absolute and Relative Velocity in Plane Motion.

UNIT - V INTRODUCTION TO ROBOTICS 9

History and growth of Robotics, Laws of Robotics, types of joints used in robots, degrees of freedom of planar and spatial manipulator, Introduction and application of autonomous mobile robots (AMRs), automated guided vehicles (AGVs), articulated robots, humanoids, cobots

TOTAL PERIODS : 45

COURES OUTCOMES: At the end of the course, learners will be able to

CO1 - On completion of the course students will be able to
CO2 - Comprehend and analysis the forces in the system.
CO3 - Solve problems in engineering systems using the concept of static equilibrium.
CO4 - Determine the centroid of objects such as areas and volumes, center of mass of body and moment of inertia of composite areas.
CO5 - Solve problems involving kinematics and kinetics of rigid bodies in plane motion.

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TEXT BOOKS:

1. Beer, F.P and Johnston Jr. E.R, Cornwell and Sanghi., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 11th Edition, McGraw-Hill Publishing company, New Delhi (2017).
2. Mikell P Groover, Mitchell Weiss, Roger N Nagel, Nicholas Odrey, Ashish Dutta "Industrial Robotics (SIE):Technology, Programming and Applications", McGraw Hill Education India., 2012

REFERENCE BOOKS:

1. Meriam J.L. and Kraige L.G., "Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, Wiley India,2017.
2. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.
3. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics" 4th Edition, Pearson Education 2006.
4. S SBhavikatti, Engineering Mechanics, New Age International Publishers, 2019
5. Vela Murali, "Engineering Mechanics", Oxford University Press, 2010

CO's, PO's & PSO's MAPPING

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS0 3
CO1	3	3	2	1	-	-	-	-	-	-	-	1	1	1	1
CO2	3	3	2	1	-	-	-	-	-	-	-	1	1	1	1
CO3	3	3	2	1	-	-	-	-	-	-	-	1	1	1	1
CO4	3	3	2	1	-	-	-	-	-	-	-	1	1	1	1
CO5	3	2	1	1	-	-	-	-	-	-	-	1	1	1	1
Avg.	3	2.8	1.8	1	-	-	-	-	-	-	-	1	1	1	1

1- Low, 2- Medium, 3- High, "-" No Correlation

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DGCT AUTONOMOUS REGULATIONS – 2024

III SEMESTER

24TRA302	ROBOT KINEMATICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To introduce Robots history, terminologies, classification and configurations.
- To study the basic components of mechanisms, analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism and design cam mechanisms for specified output motions.
- To get knowledge about forward and inverse kinematics of various serial manipulator in Geometrical and Algebraic approach.
- To get knowledge about advanced forward kinematics of serial manipulator.
- To get knowledge about Jacobian aspects and infinitesimal motion of robot mechanisms.

UNIT - I OVERVIEW OF ROBOTICS 9

Introduction to Robotics - History - Definitions - Law of Robotics – Terminologies - Classifications Overview – Links & Joints - Degrees of Freedoms - Coordinate Systems - Work Volume - Precision, Repeatability & Accuracy - Position and Orientation of Objects - Roll, Pitch and Yaw Angles - Joint Configuration of Five Types of Serial Manipulators - Wrist Configuration- Overview of end effector - Selection and Application of Serial Manipulators.

UNIT - II KINEMATICS OF MECHANISMS 9

Mechanisms – Terminology and definitions – kinematics inversions of 4 bar and slide crank chain – kinematics analysis in simple mechanisms – velocity and acceleration polygons– Analytical methods – cams – classifications – displacement diagrams - layout of plate cam profiles – derivatives of followers motion – circular arc and tangent cams.

UNIT - III FORWARD AND INVERSE KINEMATICS 9

Need for forward and Inverse Kinematics Equation – Parameters in Design and Control – Methods of forward and inverse kinematics- Issues in inverse kinematics-Geometrical and Algebraic Approach in Forward Kinematics Solution, 1 DOF - 2 DOF Planar Robot (2P and 2R); 3DOF 2RP Spatial Robot. Inverse kinematics of 2 DOF Planar robot - 2 and 3DOF planar and Spatial robot - Tool configuration -3 axis robot and 6 axis Robot - Inverse kinematics Computation- Closed loop solution

UNIT - IV FORWARD KINEMATIC MODELING – DENAVIT-HARTEBERG (DH) APPROACH 9

Unit Circle Trigonometry - Translation Matrix - Rotation matrix, Euler Angles - Quaternion Fundamental - Dot and Cross Products - Frames and Joint Coordinates - Homogeneous Transformation - D-H and Modified D-H Convention and Procedures – Forward kinematics Solution using D-H Convention: 3 DOF wrist , RR Planar, 3 DOF RRP, Cartesian, Cylindrical, Spherical , SCARA and Articulated 3 DOF robots - 3 DOF robot with wrist.

UNIT - V KINEMATIC MODELING OF DIFFERENTIAL DRIVE ROBOT 9

Degree of Mobility, Steerability and Maneuverability- Mobile Robot kinematics - Kinematic model and constraints, Mobile robot workspace – Representation of robot position –

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Kinematic models of differential wheel drive - Fixed wheel and steered wheel - Mobile manipulators and its applications swarm robots.

TOTAL PERIODS : 45

COURSE OUTCOMES: At the end of the course, learners will be able to

CO1 - Explain the history, classifications, terminologies and various configurations of robots.

CO2 - Discuss the basics of mechanism, Kinematic analysis and Design of Cam profile

CO3 - Evaluate forward kinematic model for planar and spatial robot manipulator and Evaluate inverse kinematic model for multi-DOF robot manipulators.

CO4 - Evaluate forward kinematic model for multi-DOF robot manipulators.

CO5 - Evaluate forward kinematic model for differential drive mobile robot.

TEXT BOOKS:

1. Mikell P. Groover, "Industrial Robotics", McGraw Hill, 2nd edition, 2012.
2. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", Oxford UniversityPress, 2017.
3. Lynch, Kevin M., and Frank C. Park. Modern Robotics: Mechanics, Planning, and Control 1st ed. Cambridge University Press, 2017.

REFERENCE BOOKS:

1. S K Saha, Introduction to Robotics, Tata McGraw-Hill, Second Edition, 2017.
2. Rattan,S.S,"Theory of Machines", McGraw-Hill Education Pvt. Ltd.,5th edition 2019
3. Mikell P. Groover, "Industrial Robotics", McGraw Hill, 2nd edition, 2017.
4. ArthorCritchlow, "Introduction to Robotics", 1st edition, Macmillan, 2009.
5. Mohsen Shahinpoor, "A Robot Engineering Text Book", 1st edition, Harper and Row, 2004.
6. Tsuneo Yohikwa, Foundations of Robotics Analysis and Control, Prentice Hall of India Pvt. Ltd., 2001.

CO's, PO's & PSO's MAPPING

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS0 3
CO1	3	2	1	1	-	-	-	-	-	-	-	1	1	1	1
CO2	3	2	1	1	-	-	-	-	-	-	-	1	1	1	1
CO3	3	2	1	2	-	-	-	-	-	-	-	1	1	1	1
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	1	1
CO5	3	1	1	1	-	-	-	-	-	-	-	1	1	1	1
Avg.	3	1.8	1	1.4	-	-	-	-	-	-	-	1	1	1	1

1- Low, 2- Medium, 3- High, "-" No Correlation

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DGCT AUTONOMOUS REGULATIONS – 2024

III SEMESTER

24TRA303	HYDRAULIC AND PNEUMATIC SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To recognize the standard symbols and to understand the functions of basic fluid power generation and actuation elements.
- To realize the functions of fluid regulation and control elements and its typical uses in fluid power circuit and to acquire the practice on assembling the various types of pneumatic circuits.
- To familiar and exercise the design procedure of various types of pneumatic and hydraulic fluid power circuits and to provide a training to create the various types of hydraulic circuits.
- To learn about the fundamentals of Programmable Logic Controller.
- To provide the knowledge of trouble shooting methods in fluid power systems.

UNIT - I FLUID POWER SYSTEM GENERATION AND ACTUATORS 9

Need For Automation, Classification of Drives- Hydraulic, Pneumatic and Electric – Comparison – ISO Symbols for their Elements, Selection Criteria. Generating Elements- Hydraulic Pumps and Motor - Gears, Vane, Piston Pumps – Motors - Selection and Specification - Drive Characteristics – Utilizing Elements - Linear Actuator – Types, Mounting Details, Cushioning – Power Packs –Accumulators.

UNIT - II CONTROL AND REGULATIING ELEMENTS 9

. Control and Regulating Elements - Direction, Flow and Pressure Control Valves - Methods of Actuation, Types, Sizing of Ports. Spool Valves - Operating Characteristics - Electro Hydraulic Servo Valves - Types - Characteristics and Performance.

UNIT - III CIRCUIT DESIGN FOR HYDRAULIC AND PNEUMATICS 9

Typical Design Methods – Sequencing Circuits Design - Combinational Logic Circuit Design - Cascade Method – KV Mapping - Electrical Control of Pneumatic and Hydraulic Circuits - Use of Relays, Timers, Counters and PLC in pneumatics and hydraulics.

UNIT - IV PROGRAMMABLE LOGIC CONTROLLOR 9

Industrial Automation - Programmable Logic Controller - Functions of PLCs - Features of PLC - Selection of PLC - Architecture – IEC61131-3 programming standard and types - Basics of PLC Programming – Ladder Logic Diagrams – Communication in PLC – Programming Timers and Counters – Data Handling - PLC modules – Advanced motion controlled Multi Axis PLC.

UNIT - V TROUBLE SHOOTING AND APPLICATIONS 9

Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Conditioning of hydraulic fluids Design of hydraulic circuits for Drilling, Planning, Shaping, Surface grinding, Press and Forklift applications- mobile hydraulics; Design of Pneumatic circuits for metal working, handling, clamping counter and timer circuits. – Low-cost Automation – Hydraulic and Pneumatic power packs, IOT in Hydraulics and pneumatics.

TOTAL PERIODS : 45

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COURSE OUTCOMES: At the end of the course, learners will be able to

CO1 - Recognize the various concepts of fluid power systems.
CO2 - Comprehend functions of fluid power control and Regulating systems.
CO3 - Explain the various standard fluid power circuits, functions, communication and IO details of PLC.
CO4 - Demonstrate the standard fluid power circuits and PLC based interfaces.
CO5 - Identify various troubles shooting methods in fluid power systems.

TEXT BOOKS:

Antony Esposito, "Fluid Power Systems and Control", Prentice-Hall, 2006.
Peter Rohner, "Fluid Power Logic Circuit Design", the Macmillan Press Ltd., London, 1979.
FrankD,Petruzella,"ProgrammableLogicController"McGrawHillPublications,Fourth Edition, 2016.

REFERENCE BOOKS:

Mackay S., Wrijut E., Reynders D. and Park J., "Practical Industrial Data Networks Design, Installation and Troubleshooting", Newnes Publication, Elsevier, First Edition,2004.
Jagadeesha.T., "Pneumatics Concepts, Design and Applications",UniversitiesPress,2015.
Joshi.P., Pneumatic Control",WileyIndia,2008.
Majumdar, S.R., "Oil Hydraulics Systems – Principles and Maintenance", Tata McGraw Hill, 2001
Shanmugasundaram.K., "Hydraulic and Pneumatic Controls", Chand & Co, 2006.

CO's, PO's & PSO's MAPPING

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CO1	3	1	1	1	1	-	-	-	-	-	-	1	3	2	3
CO2	3	2	1	1	2	-	-	-	-	-	-	1	3	2	3
CO3	3	2	1	1	2	-	-	-	-	-	-	1	3	2	3
CO4	3	2	1	1	2	-	-	-	-	-	-	1	3	2	3
CO5	3	1	1	1	1	-	-	-	-	-	-	1	3	2	3
Avg.	3	1.6	1	1	1.6	-	-	-	-	-	-	1	3	2	3

1- Low, 2- Medium, 3- High, "-" No Correlation

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DGCT AUTONOMOUS REGULATIONS – 2024

III SEMESTER

24TME404	MANUFACTURING TECHNOLOGY	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To understand the concept and basic mechanics of metal cutting, grinding and allied machines and broaching.
2. Working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines.
3. To understand the basic concepts of Computer Numerical Control (CNC) of machine tools and CNC Programming.

UNIT - I THEORY OF METAL CUTTING **9**

Mechanics of chip formation, single point cutting tool, forces in machining, Types of chip, cutting tools– nomenclature, orthogonal metal cutting, thermal aspects, cutting tool materials, tool wear,tool life, surface finish, cutting fluids and Machinability.

UNIT - II TURNING MACHINES **9**

Centre lathe, constructional features, specification, operations – taper turning methods, thread cutting methods, special attachments, machining time and power estimation. Capstan and turret lathes- tool layout – automatic lathes: semi automatic – single spindle : Swiss type, automatic screw type – multi spindle.

UNIT - III SHAPER, MILLING AND GEAR CUTTING MACHINES **9**

Shaper - Types of operations. Drilling, reaming, boring, Tapping. Milling operations-types of milling cutter. Gear cutting – forming and generation principle and construction of gear milling ,hobbing and gear shaping processes –finishing of gears.

UNIT - IV ABRASIVE PROCESS AND BROACHING **9**

Abrasive processes: grinding wheel – specifications and selection, types of grinding process– cylindrical grinding, surface grinding, centreless grinding and internal grinding- Typical applications – concepts of surface integrity, broaching machines: broach construction – push, pull, surface and continuous broaching machines

UNIT - V CNC MACHINING **9**

Numerical Control (NC) machine tools – CNC types, constructional details, special features, machining centre, part programming fundamentals CNC – manual part programming – micromachining – wafer machining.

TOTAL PERIODS : 45

COURSE OUTCOMES: At the end of the course students would be able to

CO1 - Explain the mechanism of material removal processes.

CO2 - Describe the constructional and operational features of centre lathe and other special purpose lathes.

CO3 - Describe the constructional and operational features of shaper, planner, milling, and drilling, sawing and broaching machines.

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CO4 - Explain the types of grinding and other super finishing processes apart from gear manufacturing processes..

CO5 - Summarize numerical control of machine tools and write a part program.

TEXT BOOKS:

1. Hajra Choudhury, "Elements of Workshop Technology", Vol.II., Media Promoters 2014
2. Rao. P.N "Manufacturing Technology - Metal Cutting and Machine Tools", 3rd Edition, Tata McGraw-Hill, New Delhi, 2013.

REFERENCE BOOKS:

1. Richerd R Kibbe, John E. Neely, Roland O. Merges and Warren J.White "Machine Tool Practices", Prentice Hall of India, 1998
2. GeofreyBoothroyd, "Fundamentals of Metal Machining and Machine Tools", McGraw Hill,1984
3. HMT, "Production Technology", Tata McGraw Hill, 1998.
4. Roy. A.Lindberg, "Process and Materials of Manufacture," Fourth Edition, PHI/Pearson Education 2006.

CO's. PO's & PSO's MAPPING

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CO2	3	3	2	1	-	-	-	-	-	-	-	2	3	3	3
CO3	3	3	2	1	-	-	-	-	1	-	1	2	3	3	3
CO4	3	3	2	1	-	1	-	-	2	-	1	2	3	3	3
CO5	3	3	2	1	-	1	-	-	2	-	1	2	3	3	3
Avg.	3	3	2	1	-	0.5	-	-	1	-	0.5	2	3	3	3

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DGCT AUTONOMOUS REGULATIONS – 2024

III SEMESTER

24TEE305	ELECTRICAL DRIVES AND ACTUATORS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To familiarize a relay and power semiconductor devices
- To get a knowledge on drive characteristics
- To obtain the knowledge on DC motors and drives.
- To obtain the knowledge on AC motors and drives.
- To obtain the knowledge on Stepper and Servo motor.

UNIT - I POWER SEMI-CONDUCTOR DEVICES 9

Characteristics -BJT, SCR, TRIAC, GTO, MOSFET, IGBT and IGCT-: SCR, MOSFET and IGBT - Triggering and commutation circuit for SCR- Introduction to Driver and snubber circuits for MOSFET

UNIT - II DRIVE CHARACTERISTICS 9

Electric drive – Equations governing motor load dynamics – steady state stability – multi quadrant Dynamics: acceleration, deceleration, torque, and Direction starting & stopping – Selection of motor.

UNIT - III DC MOTORSAND DRIVES 9

DC Servomotor - Types of PMDC & BLDC motors - principle of operation- emf and torque equations - characteristics and control – Drives- H bridge - Single and Three Phases – 4 quadrant operation – Applications

UNIT - IV AC MOTORSAND DRIVES 9

Introduction – Induction motor drives – Speed control of 3-phase induction motor – Stator voltage control – Stator frequency control – Stator voltage and frequency control – Stator current control – Static rotor resistance control – Slip power recovery control.

UNIT - V STEPPERAND SERVOMOTOR DRIVES 9

Stepper Motor: Classifications- Construction and Principle of Operation – Modes of Excitation- Drive System-Logic Sequencer - Applications. Servo Mechanism – DC Servo motor-AC Servo motor – Applications.

TOTAL PERIODS : 45

COURSE OUTCOMES: At the end of the course students would be able to

CO1 - Recognize the principles and working of relays, drives and motors.
CO2 - Explain the working and characteristics of various drives and motors.
CO3 - Apply the solid state switching circuits to operate various types of Motors and Drivers
CO4 - Interpret the performance of Motors and Drives.
CO5 - Suggest the Motors and Drivers for given applications.

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TEXT BOOKS:

1. Bimbhra B.S., "Power Electronics", 5th Edition, Kanna Publishers, New Delhi, 2012.
2. Mehta V.K. &Rohit Mehta, "Principles of Electrical Machines", 2nd Edition, S.ChandCo. Ltd., New Delhi, 2016.

REFERENCE BOOKS:

1. Gobal K. Dubey, "Fundamentals of Electrical Drives", 2nd Edition, Narosal Publishing House, New Delhi, 2001.
2. Theraja B.L. &Theraja A.K., "A Text Book of Electrical Technology", 2nd Edition, S.Chand& Co. Ltd., New Delhi, 2012.
3. Singh M.D. &Kanchandhani K.B., "Power Electronics", McGraw Hill, New Delhi, 2007

CO's, PO's & PSO's MAPPING

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS0 3
CO1	3	1	1	2	1	-	-	-	-	-	-	1	-	1	-
CO2	3	1	1	2	1	-	-	-	-	-	-	1	-	1	-
CO3	3	1	1	2	1	-	-	-	-	-	-	1	-	1	-
CO4	3	1	1	2	1	-	-	-	-	-	-	1	-	1	-
CO5	3	1	1	2	1	-	-	-	-	-	-	1	-	1	-
Avg.	3	1	1	2	1	-	-	-	-	-	-	1	-	1	-

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III – Semester

24LME301	MANUFACTURING TECHNOLOGY LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

1. To Select appropriate tools, equipment's and machines to complete a given job.
2. To Perform various welding process using GMAW and fabricating gears using gear making machines.
3. To Perform various machining process such as rolling, drawing, turning, shaping, drilling, milling and analyzing the defects in the cast and machined components.

LIST OF EXPERIMENTS:

1. Fabricating simple structural shapes using Gas Metal Arc Welding machine.
2. Preparing green sand moulds with cast patterns.
3. Taper Turning and Eccentric Turning on circular parts using lathe machine.
4. Knurling, external and internal thread cutting on circular parts using lathe machine.
5. Shaping – Square and Hexagonal Heads on circular parts using shaper machine.
6. Drilling and Reaming using vertical drilling machine.
7. Milling contours on plates using vertical milling machine.
8. Cutting spur and helical gear using milling machine.
9. Generating gears using gear hobbing machine.
10. Generating gears using gear shaping machine.
11. Grinding components using cylindrical and centerless grinding machine.
12. Grinding components using surface grinding machine.
13. Cutting force calculation using dynamometer in milling machine
14. Cutting force calculation using dynamometer in lathe machine

TOTAL PERIODS: 45

COURSE OUTCOMES:

At the end of the course the students would be able to

CO1: Demonstrate the safety precautions exercised in the mechanical workshop and join two metals using GMAW.

CO2: The students able to make the work piece as per given shape and size using machining process such as rolling, drawing, turning, shaping, drilling and milling.

CO3: The students become make the gears using gear making machines and analyze the defects in the cast and machined components

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CO's, PO's & PSO's MAPPING

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS0 3
CO1	3	-	2	-	-	1	1	1	2	1	-	1	1	2	2
CO2	3	-	2	-	-	1	1	1	2	1	-	1	1	2	2
CO3	3	-	2	-	-	1	1	1	2	1	-	1	1	2	2
Avg.	3	-	2	-	-	1	1	1	2	1	-	1	1	2	2

1- Low, 2- Medium, 3- High, "-" No Correlation

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DGCT AUTONOMOUS REGULATIONS – 2024

III SEMESTER

24LEE303	ELECTRICAL DRIVES AND ACTUATORS LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To impart knowledge on Performance of the fundamental control practices associated with AC and DC machines (starting, reversing, braking, plugging, etc.) using power electronics To impart industry oriented learning
- To evaluate the use of computer-based analysis tools to review the major classes of machines and their physical basis for operation

LIST OF EXPERIMENTS:

1. Load test on DC Motor
2. Load test on 3 Phase Induction Motor
3. Rheostat based Speed control of motors (AC and DC)
4. Switching circuits of MOSFET, IGBT, SCR and TRAIC.
5. Gate pulsation generation using PWM signals.
6. Speed control of DC motor using Power Electronic Drive.
7. Position and direction control DC servomotor using Power Electronic Drive.
8. Position, direction and speed control of BLDC motor using Power Electronic Drive.
9. Position, Direction and speed control of stepper Motor.
10. Four quadrant operation of three-phase Induction Motor using Power Electronic Drive.
11. VFD control of single phase and three-phase induction motor using Power Electronic Drive.
12. AC servomotor position, direction and speed control using Power Electronic Drive

TOTAL PERIODS :45

COURSE OUTCOMES: At the end of the course, learners will be able

CO1 - Practice the basic working of AC, DC motor, stepper motor, servo motor and synchronous motor using power electronic drive

CO2 - Demonstrate the control of AC, DC motor, stepper motor, servo motor and synchronous motor using power electronic drive

CO3 - Analyze the performance of AC, DC motor, stepper motor, servo motor and synchronous motor using power electronic drive

CO's, PO's & PSO's MAPPING

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	1	-	-	-	-	-	-	1	2	2	-
CO2	3	2	1	1	1	-	-	-	-	-	-	1	2	2	-
CO3	3	2	1	1	1	-	-	-	-	-	-	1	2	2	-
Avg.	3	2	1	1	1	-	-	-	-	-	-	1	2	2	-

1- Low, 2- Medium, 3- High, "-" No Correlation

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