DGCT AUTONOMOUS REGULATIONS – 2024

IV SEMESTER

24MRA401	ROBOTIC SYSTEM DESIGN	L	T	P	C
		3	0	2	4

OBJECTIVES:

- Designing flexible elements like belts, chain drives and threaded fasteners for robot applications.
- Designing shafts, couplings, joints and keys for robot applications.
- Designing of Gears for robot application
- Designing of Mechatronics System and interface.
- Designing and selecting of robot grippers

UNIT - I DESIGN OF BELT, CHAIN AND THREADED FASTENERS 9

Introduction to flexible elements, Design of belt drives – Flat, Vee, and Timing Belts, Design of chain drives -Threaded fasteners - Bolted joints – Simple and eccentrically loaded bolted joints.

UNIT - II DESIGN OF SHAFTS, COUPLING, JOINT AND KEYS 9

Design of solid and hollow shafts - Rigid and flexible couplings - Knuckle joints, Cotter joints-selection of Keys.

UNIT - III DESIGN OF GEARS 9

Gear materials – Speed ratios and number of teeth- Factor of safety -Design of spur & helical gears- Design of Straight bevel gear – Design of Worm Gear – Design of Cross helical.

UNIT - IV DESIGN OF MECHTRONICS SYSTEM 9

Design of Electro-Mechanical, Pneumatic-Mechanical, Hydraulic-Mechanical, Micro Electro Mechanical System-Selection of Interfacing Standards-Elements of data acquisition and control systems – Overview of I/O process-Man machine interface.

UNIT - V DESIGN OF ROBOT GRIPPERS AND ENDEFFECTORS 9

Types of End Effectors and Gripper Mechanisms, Force analysis, Miniature Grippers and Micro Grippers, Compliance, Selected case studies - Sheet metal handling, pretension of cuboid / cylindrical / objects, coils, irregular surfaces and flexible objects, handling castings, and medical applications.

TOTAL PERIODS : 45

LIST OF EXPERIMENTS:

1. 2D Sketch and 3D modeling of Sheet Metal Components
2. Creation of 3D assembly model of Flange Coupling
3. 3DModelling Mounting clamp for motor.
4. 3DModelling of GT2 pulley and belt drive system
5. 3D Modelling of Gear pump
6. 3DModellingandmotionsimulationof Rotational Joint assembly.
7. 3DModelling and motion simulation of Prismatic Joint assembly.
8. 3D Modeling and motion simulation of 2 fingered gripper assembly.

TOTAL PERIODS :30

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

CO1 - Recognize various concepts theories and parameters for machine elements in design.

CO2 - Able to select belt drive, chain drives and bearings for various applications

CO3 - Capable of selecting and designing shafts, keys and bolts in various loading conditions.

CO4 - Able to select various gears and design the gear boxes for machine tool application.

CO5 - Able to select and analyze the gripper mechanisms and end effectors for various applications.

TEXT BOOKS:

1. Bhandari.V.B,"Design of Machine Elements",Tata Mc Graw Hill Education, 5th edition, 2020.
2. Joseph Edward Shigley, Charles R. Mischke, "Mechanical Engineering Design", Mc Graw Hill,11th edition, 2020.
3. Gareth J.Monkman, Stefan Hesse, Ralf Steinmann, Henrik Schunk, "Robot Grippers", Wiley,2007.

REFERENCE BOOKS:

1. Sundararajamoorthy T. V, Shanmugam .N, "Machine Design", Anuradha Publications, 2015.
2. Robert L.Norton, "Machine Design – An Integrated Approach", Prentice Hall International Edition, 5th edition, 2018.
3. Sharma. C.S, Purohit. K.,"Design of Machine Elements", Prentice-Hall of India, 2003.
4. Adam Morecki, Joze Knapczyk, "Basics of Robotics: Theory and Components of ManipulatorsandRobots",Springer,1999.
5. ShimonY.Nof,"HandbookofIndustrialRobotics",JohnWiley&Sons,1999.
6. "P.S.G.Design Data HandBook", PSG College of TechCoimbatore.
7. MikellP.Groover,"Industrial Robotics",McGrawHill, 2nd edition, 2017.

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

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

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IV SEMESTER

24MRA402	MECHANICS OF MATERIALS	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To understand the fundamental concepts of stress, strain and elastic constants of solids under external loading
- To learn about torsion of linearly elastic materials and shell structures like thin cylinders and pressure vessels
- To learn about the shear force, bending moment and deflection of beams and study about that the analysis plane stress and strain
- To learn about the deflection of beams and stability of columns and shell structures like thin cylinders, spheres and thick cylinders and study the mechanical properties of materials when subjected to different types of loadings and study the impact strength of given specimen.
- To study the hardness properties of given specimen and understand the deflection of different beams.

UNIT - I CONCEPT OF STRESS AND STRAIN 9

Deformation of bars: Hooke's law, stress, strain, and elongation; Tensile, compressive and shear stresses in 2D solids; Elastic constants and their relations; Volumetric, linear and shear strains; Principal stresses and strain; Principal planes; Mohr's circle

UNIT - II MECHANICS OF BEAMS 9

Transverse loading on beams, point and distributed loads; Shear force and bend moment diagrams; Type of beam supports – simply supported, over-hanging, cantilevers, fixed and guided beams; Static determinacy and indeterminacy; Theory of bending of beams, pure bending stress distribution and neutral plane, second moment of area; Different cross-sections of beams; Shear stress distribution.

UNIT - III DEFLECTION OF BEAMS 9

The elastic curve -slope and displacement by integration- Discontinuity function -Slope and displacement by moment area method -Method of super position-Statically indeterminate beams and shafts-statically indeterminate beams and shafts -Method of integration- statically indeterminate beams and shafts - Moment area method - statically indeterminate beams and shafts -Method of superposition.

UNIT - IV COLUMN BUCKLING, TORSION AND TWIST 9

Critical loads using Euler's theory; Different boundary conditions; Eccentric columns. Torsion stresses and deformation of circular and hollow shafts; Polar moment of area, stepped shafts; Deflection of shafts fixed at both ends; Stresses and deflection of helical springs.

UNIT - V PRESSURE VESSELS 9

Axial and hoop stresses in cylinders subjected to internal pressure; Deformation of thin and thick cylinders; Deformation in spherical shells subjected to internal pressure; Combined thermo mechanical stress; Examples and case studies (boilers).

TOTAL PERIODS : 45

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LIST OF EXPERIMENTS:

1. Tension test on a mild steel rod
2. Double shear test on Mild steel and Aluminum rods
3. Torsion test on mild steel rod
4. Impact test on metal specimen (Charpy and Izod test)
5. Hardness test on metals – (Brinell and Rockwell Hardness Number)
6. Compression test on helical springs (Closed coil)
7. Beam Deflections using Maxwell Reciprocal Theorem
8. Strain Measurement
9. Deflection Of Continuous Beam.

TOTAL PERIODS :30

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

CO1 - Apply the principal concepts behind stress, strain and deformation of solids for various engineering applications.
CO2 - Design beams for various loading conditions
CO3 - Calculate the deflection of beams and measure the deflection of a Continuous beam
CO4 - Perform Tension, shear test, Torsion, impact test and Hardness test on given material and determine the stiffness and modulus of rigidity of the spring wire.
CO5 - Design columns and pressure vessels

TEXT BOOKS:

1. R.C HIBLER , " Mechanics of Materials", 8th edition Pearson Education, India, 2018.
2. Rajput R. K, "Strength of Materials (Mechanics of Solids)", S.Chand Publishers ,India, 2022

REFERENCE BOOKS:

1. Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., 2015.
2. Egor. P.Popov —Engineering Mechanics of Solids Prentice Hall of India, New Delhi, 2001.
3. Ramamurtham S., "Strength of Materials", Dhanpat rai publishing company, New Delhi , 2011.
4. Ferdinand P. Been, Russell Johnson, J.r. and John J. Dewole "Mechanics of Materials", Tata McGraw Hill
5. Barry J. Goodno and James M. Gere "Mechanics of Materials", Cl-Engineering; 9th Edition., Canada, 2016.

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

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CO2	3	3	3	3	-	-	-	-	1	1	1	1	2	2	1
CO3	3	3	3	3	-	-	-	-	1	1	1	1	2	2	1
CO4	3	3	3	3	-	-	-	-	1	1	1	1	2	2	1
CO5	3	3	2	2	-	-	-	-	1	1	1	1	2	2	1
Avg.	3	3	2.6	2.6	-	-	-	-	1	1	1	1	2	2	1

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

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IV SEMESTER

24TEC404	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the Addressing modes & instruction set of 8085 &8086
- To introduce commonly used Peripheral Interfacing of 8051 Microcontroller
- Develop skills in simple program writing in assembly languages
- To study and understand elements of ARM Cortex
- To study and understand the basics of embedded system

UNIT - I 16 - BIT MICROPROCESSOR 9

8086 Architecture, Instruction setand programming, Addressing modes, Interrupts Timing diagrams, Memory and I/O interfacing , Minimum and Maximum mode configurations.

UNIT - II 8051 MICROCONTROLLERS AND ITS PERIPHERAL INTERFACING 9

8051 Architecture, Instruction Set, Data Processing - Stack, Arithmetic, Logical; Branching – Unconditional and Conditional Peripheral Interfacing: Standard Interfaces - RS232, SPI and I2C, Interfacing of Sensors: DAC, ADC, PWM and LCD Interfacing, Sensor with Signal Conditioning Interface.

UNIT - III 8051 SPECIAL PURPOSE REGISTERS AND PROGRAMMING 9

Special Function Register - Interfacing of Memory Devices - Timer Programming - Serial Data Transfer - UART. I/O Ports and Port Expansion - Programming on Interrupts. Assembly Language Programs, C Language Programs Using SFR.

UNIT - IV INTRODUCTION TO ARM MICROCONTROLLERS 9

Functional Blocks of ARM, Processor Modes, Registers, Pipeline, advantages and Features, Applications of ARM microcontroller, Difference between RISC & CISC.

UNIT - V EMBEDDED SYSTEMS 9

Components of Embedded System, Classification, Architecture, functionality, Processors, Embedded system design process, Basic Structure of an Embedded C Program Real time Embedded system.

TOTAL PERIODS : 45

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

CO1 - Write assembly language program for 8 and 16 bit microprocessor
CO2 - Design and implement interfacing of peripheral with microcontroller
CO3 - Analyze, design and simulate microcontroller based systems
CO4 - Analyze, design and simulate microcontroller based systems used for control and monitoring
CO5 - Understand basics of Embedded System.

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TEXT BOOKS:

1. Ramesh S. Gaonkar,"'Microprocessor Architecture Programming and Application", Pen ram International (P)ltd., Mumbai, 6th Education, 2013.
2. Muhammad Ali Mazidi& Janice GilliMazidi,"The 8051 Micro Controller and EmbeddedSystems", Pearson Education, Second Edition 2011.
3. K.VShibu, "Introduction to Embedded System",2nd Edition 2016.
4. Wayne Wolf, "Principles of Embedded Computing System Design", 2nd Edition 2018.

REFERENCE BOOKS:

1. Douglas V. Hall, "Micro-processors & Interfacing", Tata McGraw Hill 3rd Edition, 2017
2. Krishna Kant, "Micro-processors & Micro-controllers", Prentice Hall of India, 2007
3. Kenneth Ayala, "The 8051 Microcontroller", Thomson, 3rd Edition 2004
4. Mike Predko, "8051 Micro-controllers", McGraw Hill, 2009.
5. Steve Furber, "ARM System-on-Chip Architecture",2nd Edition 2016.

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

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

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

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IV SEMESTER

24TEE406	SENSORS AND INSTRUMENTATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concepts of measurement technology.
- To learn the various sensors used to measure various physical parameters.
- To learn the fundamentals of signal conditioning, data acquisition and communication systems used in mechatronics system development
- To learn about the optical, pressure and temperature sensor
- To understand the signal conditioning and DAQ systems

UNIT - I INTRODUCTION 9

Basics of Measurement – Classification of errors – Error analysis – Static and dynamic characteristics of transducers – Performance measures of sensors – Classification of sensors.

UNIT - II MOTION, PROXIMITY AND RANGING SENSORS 9

Motion Sensors – Potentiometers, Resolver, Encoders – Optical, Magnetic, Inductive, Capacitive, LVDT – RVDT – Synchro –Accelerometer – GPS, Bluetooth, Range Sensors – RF beacons, Ultrasonic Ranging, Reflective beacons, Laser Range Sensor (LIDAR).

UNIT - III FORCE, MAGNETIC AND HEADING SENSORS 9

Strain Gage, Load Cell, Magnetic Sensors –types, principle, requirement and advantages: Magneto resistive – Hall Effect – Current sensor Heading Sensors – Compass, Gyroscope, Inclinometers.

UNIT - IV OPTICAL, PRESSURE AND TEMPERATURE SENSORS 9

Photo conductive cell, photo voltaic, Photo resistive, LDR – Fiber optic sensors – Pressure – Diaphragm, Bellows, Piezoelectric – Tactile sensors, Temperature – IC, Thermistor, RTD, Thermocouple. Acoustic Sensors – flow and level measurement, Radiation Sensors.

UNIT - V SIGNAL CONDITIONING AND DAQ SYSTEMS 9

Amplification – Filtering – Sample and Hold circuits – Data Acquisition: Single channel and multi-channel data acquisition – Data logging - applications - Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring.

TOTAL PERIODS : 45

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

CO1 - Recognize with various calibration techniques and signal types for sensors.
CO2 - Describe the working principle and characteristics of force, magnetic, heading, pressure and temperature, smart and other sensors and transducers.
CO3 - Apply the various sensors and transducers in various applications
CO4 - Select the appropriate sensor for different applications.
CO5 - Acquire the signals from different sensors using Data acquisition systems.

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TEXT BOOKS:

1. Ernest O Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill, 2009.
2. Sawney A K and Puneet Sawney, "A Course in Mechanical Measurements and Instrumentation and Control", Dhanpat Rai& Co, 12th edition New Delhi, 2013.

REFERENCE BOOKS:

1. C. Sujatha Dyer, S.A., Survey of Instrumentation and Measurement, John Wiley & Sons, Canada, 2001.
2. Hans Kurt Tönshoff (Editor), Ichiro, "Sensors in Manufacturing" Volume 1, Wiley-VCH April 2001.
3. John Turner and Martyn Hill, "Instrumentation for Engineers and Scientists", Oxford Science Publications, 1999.
4. Patranabis D, "Sensors and Transducers", 2nd Edition, PHI, New Delhi, 2011.
5. Richard Zurawski, "Industrial Communication Technology Handbook" 2nd edition, CRC Press, 2015.

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

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

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IV SEMESTER

24TCH401	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY	L	T	P	C
		2	0	0	2

OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyse climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyses the role of sustainable urbanization.

UNIT - I ENVIRONMENT AND BIODIVERSITY **6**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ

UNIT - II ENVIRONMENTAL POLLUTION **6**

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection acts – air, water and soil.

UNIT - III RENEWABLE SOURCES OF ENERGY **6**

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Solar energy conversion: Principle, working and applications of solar cells; recent developments in solar cell materials and Wind energy. Applications of- Hydrogen energy, Ocean energy resources (OTE), Tidal energy ,Concept, origin and power plants of geothermal energy.

UNIT - IV SUSTAINABILITY AND MANAGEMENT **6**

Sustainability- concept, needs and challenges-economic, social aspects of sustainability from unsustainability and, GDP. Recent WHO policy- Conservation & Development - National Environment Policy(NEP), National Action Plan on Climate Change (NAPCC) , National Mission for Green India (NMRI) .Global, Regional and local environmental issues and possible solutions variation in population among nations - population policy, women and child welfare programs. Role of IT in human and health, HIV, AIDS, Drug Abuse and

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COVID-19 - effects and preventive measures.

Unit - V SUSTAINABILITY PRACTICES 6

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Food wastage, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles, carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socioeconomically and technological changes.

TOTAL PERIODS : 30

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

CO1 - To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation

CO2 - To identify the causes, effects of environmental pollution and natural disasters and contriute to the preventive measures in the society.

CO3 - To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.

CO4 - To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.

CO5 - To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

TEXT BOOKS:

AnubhaKaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018

Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016

REFERENCE BOOKS:

R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38 . edition 2010

Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.

Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.

ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

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	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
CO2	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
CO3	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
CO4	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
CO5	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
Avg.	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-

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

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IV SEMESTER

24MEE401	CONTROL SYSTEMS ENGINEERING	L	T	P	C
		2	0	2	3

OBJECTIVES:

- To introduce the components and their representation of control systems
- To learn various methods for analyzing the time response, frequency response and stability of the systems.
- To learn the various approach for the system frequency analysis
- To understand the concept of stability analysis
- To know about the state variable methods of control system analysis

UNIT - I SYSTEMS COMPONENTS AND THEIR REPRESENTATION 9

Control System: Terminology and Basic Structure-Feed forward and Feedback control theory-Electrical and Mechanical Transfer Function Models-Block diagram Models-Signal flow graphs

UNIT - II TIME RESPONSE ANALYSIS 9

Transient analysis -steady state response-Measures of performance of the standard first order and second order system-effect on an additional zero and an additional pole-steady error constant and system- type number-PID control-Analytical design for PD, PI, PID control systems

UNIT - III FREQUENCY RESPONSE AND SYSTEM ANALYSIS 9

Closed loop frequency response-Performance specification in frequency domain-Frequency response of standard second order system- Bode Plot - Polar Plot-Design of compensators using Bode plots- Cascade lead, lag and lag-lead compensation

UNIT - IV CONCEPTS OF STABILITY ANALYSIS 9

Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relative stability-Root locus concept-Guidelines for sketching root locus

UNIT - V CONTROL SYSTEM ANALYSIS USING STATE VARIABLE METHODS 9

State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability

TOTAL PERIODS : 30

LIST OF EXPERIMENTS:

1. Mathematical Modelling and Simulation of a Physical Systems and Simulation and Reduction of Cascade and Parallel, and Closed Loop Sub-System
2. Simulation and Analysis of First and Second Order System Equations in Time and Frequency Domain
3. Simulation and Analysis of System using Root-Locus and Bode Plot
4. Simulation and Implementation of PID Combination for First Order

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Systems

5. Simulation and Implementation of PID Combination Second Order Systems
6. Auto tuning of PID parameters and analysis of PID Control
7. Transfer function AC/DC servo Motors

TOTAL PERIODS :30

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

CO1 - State the various control terminologies and concepts.
CO2 - Know the procedures in developing the transfer function, state space models and time and frequency domain analysis methods.
CO3 - Apply the procedures on developing the systems in transfer function and state space approach and apply to evaluate the performance of system in time and frequency domain techniques.
CO4 - Illustrate the time and frequency response characteristics of system response
CO5 - Analyze the performance of system using various time and frequency domain techniques

TEXT BOOKS:

1. M.Gopal,"Control System – Principles and Design", Tata McGraw Hill, 4th Edition, 2012.
2. K.Ogata, "Modern Control Engineering", PHI, 5 th Edition, 2012.

REFERENCE BOOKS:

1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007
2. S.K.Bhattacharya, "Control System Engineering", Pearson, 3 rd Edition, 2013.
3. Benjamin.C.Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition,1995
4. NagoorKani, "Conrol Systems", RBA Publications, 2017.
5. Norman. S. Nise, "Control Systems Engineering", Wiley India edition, 2018

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

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CO4	3	2	1	1	2	1	-	-	-	-	-	1	2	1	-
CO5	3	2	1	1	2	1	-	-	-	-	-	1	2	1	-
Avg.	3	2	1	1	2	1	-	-	-	-	-	1	2	1	-

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IV SEMESTER

24S001	EMPLOYABILITY SKILLS - I	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To solve basic math problems like time, speed, work, and percentages.
- To improve communication, teamwork, and time management skills.
- To write programs to solve problems using coding and algorithms.
- To prepare for placements with better technical and soft skills.
- To solve basic math problems like time, speed, work, and percentages.

MODULE – I APTITUDE - I **10**

Number Systems – LCM & HCF – Work & Wages – Time, Distance and Speed – Pipes and Cisterns – Trains, Boats and Streams – Averages and Percentages – Allegations and Mixtures – Profit and Loss

MODULE – II SOFT SKILLS - I **10**

Goal Setting - Motivation – Problem Solving – Cognitive Skills – Personal Qualities – Ethics – Effective Communication – Interpersonal Skills – Teamwork – Time Management – Positivity – Role Play – Emotional Maturity – Emotional Health

MODULE – III PROBLEM SOLVING -I **10**

Mathematical – Bit Manipulation – Design Pattern – - Counting - Arrays - Matrix - Searching – Sorting – Strings – Stack – Queue – Pointer – Series - Online Preparation - Leetcode - Code chef – Hacker rank – Geeks for geek

TOTAL PERIODS : 30

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

CO1 - Develop students' ability to solve quantitative problems for placement tests.
CO2 - Enhance soft skills like communication, teamwork, and time management for professional growth.
CO3 - Build problem-solving skills using programming and algorithms
CO4 - Prepare students for technical assessments and interviews in campus placements.

TEXT BOOKS:

1. R.S. Aggarwal, "Quantitative Aptitude for Competitive Examinations", S. Chand Publishing, 2001
2. Stephen R. Covey,"The 7 Habits of Highly Effective People", Free Press (Simon & Schuster), 1989

REFERENCE BOOK:

1. https://www.geeksforgeeks.org/
2. https://leetcode.com/
3. https://www.hackerrank.com/

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IV SEMESTER

24LEE404	SENSORS AND INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To learn about various force, pressure and vibration measuring sensors.
- To learn about various Temperature, light and magnetic field measuring sensors
- To learn about various displacement and speed measuring sensors.

LIST OF EXPERIMENTS:

1. Determination of Load, Torque and Force using Strain Gauge.
2. Determination of the characteristics of Pressure Sensor and Piezoelectric Force Sensor
3. Determination of Displacement using LVDT.
4. Determine the Characteristics of Various Temperature Sensors.
5. Determine the Characteristics of Various Light Detectors (Optical Sensors).
6. Distance Measurement using Ultrasonic and Laser Sensor.
7. Determine angular velocity of gyroscope,
8. Vibration measurement using Accelerometer.
9. Direction measurement using Magnetometer.
10. Speed, Position and Direction Measurement Using Encoders.
11. Force measurement using 3 axis force sensor.
12. Force Measurement using tactile sensors.
13. Data acquisition, visualization and analysis of signals

TOTAL PERIODS :45

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

CO1 - Demonstrate the various contact and non-contact sensors
CO2 - Analyze and Identify appropriate sensors for given applications
CO3 - Create a sensor system for given requirements

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	2	1	-	-	-	-	-	1	2	1	-
CO2	3	2	1	1	2	1	-	-	-	-	-	1	2	1	-
CO3	3	2	1	1	2	1	-	-	-	-	-	1	2	1	-
Avg.	3	2	1	1	2	1	-	-	-	-	-	1	2	1	-

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

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SEMESTER - I
24XGE001 INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow

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for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories,

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workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering /Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.
Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References: Guide to Induction from AICTE

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MANDATORY COURSE SYLLABUS

24XGE002	INDIAN CONSTITUTION	L	T	P	C
		3	0	0	0

UNIT - I 9

1. Constitutional Development Since 1909 to 1947
2. Making of the Constitution.
3. Constituent Assembly

UNIT - II 9

1. Fundamental Rights
2. Fundamental Duties
3. Directive Principles of State Policy

UNIT - III 9

1. President
2. Parliament
3. Supreme Court

UNIT - IV 9

1.Governor
2. State Legislature
3. High Court

UNIT - V 9

1. Secularism
2. Social Justice
3. Minority Safeguards

Total Periods : 45

REFERENCE BOOKS:

1. Basu. D.D.: Introduction to Indian Constitution ; Prentice Hall; New Delhi.
2. Kapur. A.C: Indian Government and Political System; S.Chand and Company Ltd., New Delhi.
3. Johari J.C.: Indian Politics, Vishal Publications Ltd, New Delhi
4. Agarwal R.C: Indian Political System; S.Chand & Co., New Delhi

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24XGE003	DESIGN THINKING	L	T	P	C
		3	0	0	0

COURSE OBJECTIVES

The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

UNIT - I AN INSIGHT TO LEARNING

Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting

UNIT - II REMEMBERING MEMORY

Understanding the Memory process, Problems in retention, Memory enhancement techniques

UNIT - III EMOTIONS: EXPERIENCE & EXPRESSION

Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers

UNIT - IV BASICS OF DESIGN THINKING

Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test

UNIT - V BEING INGENIOUS & FIXING PROBLEM

Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem Solving

UNIT - VI PROCESS OF PRODUCT DESIGN

Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design

UNIT - VII PROTOTYPING & TESTING

What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, Sample Example, Test Group Marketing

UNIT -VIII CELEBRATING THE DIFFERENCE

Understanding Individual differences & Uniqueness, Group Discussion and Activities to encourage the understanding, acceptance and appreciation of Individual differences

UNIT - IX DESIGN THINKING & CUSTOMER CENTRICITY

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Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design

UNIT X FEEDBACK, RE-DESIGN & RE-CREATE

Feedback loop, Focus on User Experience, Address "ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – "Solving Practical Engineering Problem through Innovative Product Design & Creative Solution".

Total Periods: 45

Course Outcomes:

At the end of the course students should be able to:

CO1: Compare and classify the various learning styles and memory techniques and Apply them in their engineering education

CO2: Analyze emotional experience and Inspect emotional expressions to better understand users while designing innovative products

CO3: Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking process for

CO4: Propose real-time innovative engineering product designs and Choose appropriate frameworks, strategies, techniques during prototype development

CO5: Perceive individual differences and its impact on everyday decisions and further Create a better customer experience

Text/Reference Books:

1. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company.

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24XGE004	INTRODUCTION TO WOMEN AND GENDER STUDIES	L	T	P	C
		3	0	0	0

UNIT - I CONCEPTS 9

Sex vs. Gender, masculinity, femininity, socialization, patriarchy, public/ private, essentialism, binaryism, power, hegemony, hierarchy, stereotype, gender roles, gender relation, deconstruction, resistance, sexual division of labour

UNIT - II FEMINIST THEORY 9

Liberal, Marxist, Socialist, Radical, Psychoanalytic, postmodernist, ecofeminist.

UNIT - III WOMEN'S MOVEMENTS: GLOBAL, NATIONAL AND LOCAL 9

Rise of Feminism in Europe and America.
Women's Movement in India

UNIT - IV GENDER AND LANGUAGE 9

Linguistic Forms and Gender.
Gender and narratives.

UNIT - V GENDER AND REPRESENTATION 9

Advertising and popular visual media.

Gender and Representation in Alternative Media.
Gender and social media

Total Periods : 45

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DGCT AUTONOMOUS REGULATIONS – 2024

24XGE005	ELEMENTS OF LITERATURE	L	T	P	C
		3	0	0	0

Course Objectives:

- To make the students aware about the finer sensibilities of human existence through an art form. The students will learn to appreciate different forms of literature as suitable modes of expressing human experience.

UNIT - I **INTRODUCTION TO ELEMENTS OF LITERATURE** **9**

1. Relevance of literature
   a) Enhances Reading, thinking, discussing and writing skills.
   b) Develops finer sensibility for better human relationship.
   c) Increases understanding of the problem of humanity without bias.
   d) Providing space to reconcile and get a cathartic effect

UNIT - II **ELEMENTS OF FICTION** **9**

a) Fiction, fact and literary truth.
b) Fictional modes and patterns.
c) Plot character and perspective.

3. Elements of poetry

UNIT - III **ELEMENTS OF POETRY** **9**

a) Emotions and imaginations.
b) Figurative language.
c) (Simile, metaphor, conceit, symbol, pun and irony).
d) Personification and animation. e) Rhetoric and trend.

UNIT - IV **OTHER SESSION** **9**

4.1*Tutorials:
4.2*Laboratory:
4.3*Project: The students will write a term paper to show their understanding of a particular piece of literature

UNIT - V **ASSESSMENT** **9**

5.1 HA:
5.2 Quizzes-HA:
5.3 Periodical Examination: one
5.4 Project/Lab: one (under the guidance of the teachers the students will take a volume of poetry, fiction or drama and write a term paper to show their understanding of it in a given context; sociological, psychological, historical, autobiographical etc.
5.5 Final Exam

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Total Periods : 45

Course outcome :

1. Students will be able to understand the relevance of literature in human life and appreciate its aspects in developing finer sensibilities.

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24XGE006	FILM APPRECIATION	L	T	P	C
		3	0	0	0

Course Objectives:

In this course on film appreciation, the students will be introduced broadly to the development of film as an art and entertainment form. It will also discuss the language of cinema as it evolved over a century. The students will be taught as to how to read a film and appreciate the various nuances of a film as a text. The students will be guided to study film joyfully.

Theme - A THE COMPONENT OF FILMS 9

A-1: The material and equipment
A-2: The story, screenplay and script
A-3: The actors, crew members, and the director
A-4: The process of film making... structure of a film

Theme - B: EVOLUTION OF FILM LANGUAGE 9

B-1: Film language, form, movement etc.
B-2: Early cinema... silent film (Particularly French)
B-3: The emergence of feature films: Birth of a Nation
B-4: Talkies

Theme - C FILM THEORIES AND CRITICISM/APPRECIATION 9

C-1: Realist theory; Auteurists
C-2: Psychoanalytic, Ideological, Feminists
C-3: How to read films?
C-4: Film Criticism / Appreciation

Theme – D DEVELOPMENT OF FILMS 9

D-1: Representative Soviet films
D-2: Representative Japanese films
D-3: Representative Italian films
D-4: Representative Hollywood film and the studio system

Theme - E INDIAN FILMS 9

E-1: The early era
E-2: The important films made by the directors
E-3: The regional films
E-4: The documentaries in India

Total Periods : 45

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READING:

A Reader containing important articles on films will be prepared and given to the students. The students must read them and present in the class and have discussion on these.

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24XGE007	DISASTER RISK REDUCTION AND MANAGEMENT	L	T	P	C
		3	0	0	0

Course Objectives:

- To impart knowledge on concepts related to disaster, disaster risk reduction, disaster
- To acquaint with the skills for planning and organizing disaster response

UNIT-1 HAZRADS, VULNERABILITY AND DISASTER RISKS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Types of Disasters: Natural, Human induced, Climate change induced –Earthquake, Landslide, Flood, Drought, Fire etc – Technological disasters- Structural collapse, Industrial accidents, oil spills -Causes, Impacts including social, Economic, political, environmental, health, psychosocial, etc.- Disaster vulnerability profile of India and Tamil Nadu - Global trends in disasters: urban disasters, pandemics, Complex emergencies, - - , Inter relations between Disasters and Sustainable development Goals.

UNIT-II DISASTER RISK REDUCTION (DRR) 9

Sendai Framework for Disaster Risk Reduction, Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community Based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Early Warning System – Advisories from Appropriate Agencies.- Relevance of indigenous Knowledge, appropriate technology and Local resources.

UNIT-III DISASTER MANAGEMENT 9

Components of Disaster Management – Preparedness of rescue and relief, mitigation, rehabilitation and reconstruction- Disaster Risk Management and post disaster management – Compensation and Insurance- Disaster Management Act (2005) and Policy - Other related policies, plans, programmers and legislation - Institutional Processes and Framework at State and Central Level- (NDMA –SDMA-DDMA-NRDF- Civic Volunteers)

UNIT-IV TOOLS AND TECHNOLOGY FOR DISASTER MANAGEMENT 9

Early warning systems -Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment. - Elements of Climate Resilient Development – Standard operation Procedure for disaster response – Financial planning for disaster Management.

UNIT-V DISASTER MANAGEMENT: CASE STUDIES 9

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Discussion on selected case studies to analyse the potential impacts and actions in the contest of disasters-Landslide Hazard Zonation: Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.- Field work-Mock drill

Total Periods : 45

Text Books:

1. Taimpo (2016), Disaster Management and Preparedness, CRC Publications
2. Singh R (2017), Disaster Management Guidelines for earthquakes, Landslides, Avalanches and tsunami, Horizon Press Publications
3. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
4. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

Reference Books:

1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005.
2. Government of India, National Disaster Management Policy, 2009.
3. Shaw R (2016), Community based Disaster risk reduction, Oxford University Press

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24XGE008	WELL-BEING WITH TRADITIONAL PRACTICES-YOGA, AYURVEDA AND SIDDHA	L	T	P	C
		3	0	0	0

Course Objectives:

- To enjoy life happily with fun filled new style activities that help to maintain health also
- To adapt a few lifestyle changes that will prevent many health disorders
- To be cool and handbill every emotion very smoothly in every walk of life
- To learn to eat cost effective but healthy foods that are rich in essential nutrients
- To develop immunity naturally that will improve resistance against many health disorders

UNIT-1 HEALTH AND ITS IMPORTANCE 9

Health: Definition - Importance of maintaining health - More importance on prevention than treatment Ten types of health one has to maintain - Physical health - Mental health - Social health - Financial health - Emotional health - Spiritual health - Intellectual health - Relationship health - Environmental health - Occupational/Professional heath.

Present health status - The life expectancy-present status - mortality rate - dreadful diseases - Non-communicable diseases (NCDs) the leading cause of death - 60% - heart disease – cancer – diabetes - chronic pulmonary diseases - risk factors – tobacco – alcohol - unhealthy diet - lack of physical activities

Types of diseases and disorders - Lifestyle disorders – Obesity – Diabetes - Cardiovascular diseases – Cancer – Strokes – COPD - Arthritis - Mental health issues. Causes of the above diseases / disorders - Importance of prevention of illness - Takes care of health - Improves quality of life - Reduces absenteeism - Increase satisfaction - Saves time

Simple lifestyle modifications to maintain health - Healthy Eating habits (Balanced diet according to age) Physical Activities (Stretching exercise, aerobics, resisting exercise) - Maintaining BMI-Importance and actions to be taken.

UNIT-II DIET 9

Role of diet in maintaining health - energy one needs to keep active throughout the day - nutrients one needs for growth and repair - helps one to stay strong and healthy - helps to prevent diet-related illness, such as some cancers - keeps active and - helps one to maintain a healthy weight - helps to reduce risk of developing lifestyle disorders like diabetes – arthritis – hypertension – PCOD – infertility – ADHD – sleeplessness -helps to reduce the risk of heart diseases - keeps the teeth and bones strong.

Balanced Diet and its 7 Components - Carbohydrates – Proteins – Fats – Vitamins – Minerals - Fibre and Water.

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Food additives and their merits & demerits - Effects of food additives - Types of food additives - Food additives and processed foods - Food additives and their reactions

Definition of BMI and maintaining it with diet

Importance - Consequences of not maintaining BMI - different steps to maintain optimal BM

Common cooking mistakes

Different cooking methods, merits and demerits of each method

UNIT-III ROLE OF AYURVEDA & SIDDHA SYSTEMS IN MAINTAINING HEALTH 9

AYUSH systems and their role in maintaining health - preventive aspect of AYUSH - AYUSH as a soft therapy.

Secrets of traditional healthy living - Traditional Diet and Nutrition - Regimen of Personal and Social Hygiene - Daily routine (Dinacharya) - Seasonal regimens (Ritucharya) - basic sanitation and healthy living environment - Sadvritta (good conduct) - for conducive social life.

Principles of Siddha & Ayurveda systems - Macrocosm and Microcosm theory - Pancheekarana Theory / (Five Element Theory) 96 fundamental Principles - Uyir Thathukkal (Tri-Dosha Theory) - Udal Thathukkal

Prevention of illness with our traditional system of medicine Primary Prevention - To decrease the number of new cases of a disorder or illness - Health promotion/education, and - Specific protective measures - Secondary Prevention - To lower the rate of established cases of a disorder or illness in the population (prevalence) - Tertiary Prevention - To decrease the amount of disability associated with an existing disorder

UNIT-IV MENTAL WELLNESS 9

Emotional health - Definition and types - Three key elements: the subjective experience - the physiological response - the behavioral response - Importance of maintaining emotional health - Role of emotions in daily life -Short term and long term effects of emotional disturbances - Leading a healthy life with emotions - Practices for emotional health - Recognize how thoughts influence emotions - Cultivate positive thoughts - Practice self-compassion - Expressing a full range of emotions.

Stress management - Stress definition - Stress in daily life - How stress affects one's life - Identifying the cause of stress - Symptoms of stress - Managing stress (habits, tools, training, professional help) - Complications of stress mismanagement.

Sleep - Sleep and its importance for mental wellness - Sleep and digestion.

Immunity - Types and importance - Ways to develop immunity

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24XGE009	HISTORY OF SCIENCE AND TECHNOLOGY IN INDIA	L	T	P	C
		3	0	0	0

UNIT-1 CONCEPTS AND PERSPECTIVES **9**

Meaning of History Objectivity, Determinism, Relativism, Causation, Generalization in History; Moral judgment in history Extent of subjectivity, contrast with physical sciences, interpretation and speculation, causation verses evidence, concept of historical inevitability, Historical Positivism. Science and Technology-Meaning, Scope and Importance, Interaction of science, technology & society, Sources of history on science and technology in India.

UNIT-II HISTORIOGRAPHY OF SCIENCE AND TECHNOLOGY IN INDIA **9**

Introduction to the works of D.D. Kosambi, Dharmpal, Debiprasad Chattopadhyay, Rehman, S. Irfan Habib, Deepak Kumar, Dhruv Raina, and others.

UNIT-III SCIENCE AND TECHNOLOGY IN ANCIENT INDIA **9**

Technology in pre-historic period
Beginning of agriculture and its impact on technology
Science and Technology during Vedic and Later Vedic times
Science and technology from 1st century AD to C-1200.

UNIT-IV SCIENCE AND TECHNOLOGY IN MEDIEVAL INDIA **9**

Legacy of technology in Medieval India, Interactions with Arabs Development in medical knowledge, interaction between Unani and Ayurveda and alchemy Astronomy and Mathematics: interaction with Arabic Sciences Science and Technology on the eve of British conquest

UNIT-V SCIENCE AND TECHNOLOGY IN COLONIAL INDIA **9**

Science and the Empire
Indian response to Western Science
Growth of techno-scientific institutions

UNIT-VI SCIENCE AND TECHNOLOGY IN A POST-INDEPENDENT INDIA **9**

Science, Technology and Development discourse
Shaping of the Science and Technology Policy
Developments in the field of Science and Technology
Science and technology in globalizing India
Social implications of new technologies like the Information Technology and Biotechnology

Total Periods : 45

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UNIT-V YOGA 9

Definition and importance of yoga - Types of yoga - How to Choose the Right Kind for individuals according to their age - The Eight Limbs of Yoga - Simple yogasanas for cure and prevention of health disorders - What yoga can bring to our life

Total Periods : 45

Course Outcomes:

At the end of the course students should be able

CO1: :Learn the importance of different components of health

CO2: Gain confidence to lead a healthy life

CO3: Learn new techniques to prevent lifestyle health disorders

CO4: :Understand the importance of diet and workouts in maintaining health

Text Books:

1. Nutrition and Dietetics - Ashley Martin, Published by White Word Publications, New York, NY 10001, USA
2. Yoga for Beginners_ 35 Simple Yoga Poses to Calm Your Mind and Strengthen Your Body, by Cory Martin, Copyright © 2015 by Althea Press, Berkeley, California

Reference Books:

1. WHAT WE KNOW ABOUT EMOTIONAL INTELLIGENCE How It Affects Learning, Work, Relationships, and Our Mental Health, by Moshe Zeidner, Gerald Matthews, and Richard D. Robert
2. A Bradford Book, The MIT Press, Cambridge, Massachusetts, London, England The Mindful Self-Compassion Workbook, Kristin Neff, Ph.D Christopher Germer, Ph.D, Published by The Guilford Press A Division of Guilford Publications, Inc.370 Seventh Avenue, Suite 1200, New York, NY 10001

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Text Books:

1. Nutrition and Dietetics - Ashley Martin, Published by White Word Publications, New York, NY 10001, USA
2. Martin, Copyright © 2015 by Althea Press, Berkeley, California

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DGCT AUTONOMOUS REGULATIONS – 2024

24XGE010 POLITICAL AND ECONOMIC THOUGHT FOR A HUMANE SOCIETY

L	T	P	C
3	0	0	0

Course Objectives:

This course will begin with a short overview of human needs and desires and how different political-economic systems try to fullfill them. In the process, we will end with a critique of different systems and their implementations in the past, with possible future directions.

Course Topics :

Considerations for humane society, holistic thought, human being's desires, harmony in self, harmony in relationships, society, and nature, societal systems. (9 lectures, 1 hour each)
(Refs: A Nagaraj, M K Gandhi, JC Kumarappa)
Capitalism – Free markets, demand-supply, perfect competition, laissez-faire, monopolies, imperialism. Liberal democracy. (**5 lectures**)
(Refs: Adam smith, J S Mill)
Fascism and totalitarianism. World war I and II. Cold war. (**2 lectures**)
Communism – Mode of production, theory of labour, surplus value, class struggle, dialectical materialism, historical materialism, Russian and Chinese models.
(Refs: Marx, Lenin, Mao, M N Roy) (**5 lectures**)
Welfare state. Relation with human desires. Empowered human beings, satisfaction. (3 lectures)
Gandhian thought. Swaraj, Decentralized economy & polity, Community. Control over one's lives. Relationship with nature. (6 lectures)
(Refs: M K Gandhi, Schumacher, Kumarappa)
Essential elements of Indian civilization. (**3 lectures**)
(Refs: Pt Sundarlal, R C Mazumdar, Dharampal) Technology as driver of society, Role of education in shaping of society. Future directions. (**4 lectures**)
(Refs: Nandkishore Acharya, David Dixon, Levis Mumford)
Conclusion (2 lectures)

Total Lectures: 39

Preferred Textbooks: See Reference Books

Reference Books:

Authors mentioned along with topics above. Detailed reading list will be provided.

Grading:

Mid sem	30
End sem	20
Home Assign	10
Term paper	40

Total Periods : 45

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Course Outcomes:

The students will get an understanding of how societies are shaped by philosophy, political and economic system, how they relate to fulfilling human goals & desires with some case studies of how different attempts have been made in the past and how they have fared.

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		L	T	P	C
24XGE011	STATE, NATION BUILDING AND POLITICS IN INDIA	3	0	0	0

Course Objectves:

The objective of the course is to provide an understanding of the state, how it works through its main organs, primacy of politics and political process, the concept of sovereignty and its changing contours in a globalized world. In the light of this, an attempt will be made to acquaint the students with the main development and legacies of national movement and constitutional development in India, reasons for adopting a Parliamentary-federal system, the broad philosophy of the Constitution of India and the changing nature of Indian Political System. Challenges/ problems and issues concerning national integration and nation-building will also be discussed in the contemporary context with the aim of developing a future vision for a better

Topics: Understanding the need and role of State and politics.

Development of Nation-State, sovereignty, sovereignty in a globalized world.

Organs of State – Executive, Legislature, Judiciary. Separation of powers, forms of governmentunitary-federal, Presidential-Parliamentary,
The idea of India.

1857 and the national awakening.

1885 Indian National Congress and development of national movement – its legacies.
Constitution making and the Constitution of India.
Goals, objective and philosophy.
Why a federal system?
National integration and nation-building.

Challenges of nation-building – State against democracy (Kothari)
New social movements.
The changing nature of Indian Political System, the future scenario.
What can we do?

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Course Outcomes:

It is expected that this course will make students aware of the theoretical aspect of the state, its organs, its operationalization aspect, the background and philosophy behind the founding of the present political system, broad streams and challenges of national integration and nation-building in India. It will equip the students with the real understanding of our political system/ process in correct perspective and make them sit up and think for devising ways for better participation in the system with a view to making the governance and delivery system better for the common man who is often left unheard and unattended in our democratic setup besides generating a lot of dissatisfaction and difficulties for the system.

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24XGE012	INDUSTRIAL SAFETY	L	T	P	C
		3	0	0	3

Course Objectives:

- To Understand the Introduction and basic Terminologies safety.
- To enable the students to learn about the Important Statutory Regulations and standards.
- To enable students to Conduct and participate the various Safety activities in the Industry.
- To have knowledge about Workplace Exposures and Hazards.
- To assess the various Hazards and consequences through various Risk Assessment Techniques

UNIT – I SAFETY TERMINOLOGIES 9

Hazard-Types of Hazard- Risk-Hierarchy of Hazards Control Measures-Lead indicators- lag Indicators-Flammability- Toxicity Time-weighted Average (TWA) - Threshold LimitValue (TLV) - Short Term Exposure Limit (STEL)- Immediately dangerous to life or health (IDLH)- acute and chronic Effects- Routes of Chemical Entry-Personnel Protective Equipment- Health and Safety Policy-Material Safety Data Sheet MSDS

UNIT II STANDARDS AND REGULATIONS 9

Indian Factories Act-1948- Health- Safety- Hazardous materials and Welfare- ISO 45001:2018 occupational health and safety (OH&S) - Occupational Safety and Health Audit IS14489:1998- Hazard Identification and Risk Analysis- code of practice IS 15656:2006.

UNIT III SAFETY ACTIVITIES 9

Toolbox Talk- Role of safety Committee- Responsibilities of Safety Officers and Safety Representatives- Safety Training and Safety Incentives- Mock Drills- On-site Emergency Action Plan- Off-site Emergency Action Plan- Safety poster and Display- Human Error Assessment.

UNIT IV WORKPLACE HEALTH AND SAFETY 9

Noise hazard- Particulate matter- musculoskeletal disorder improper sitting poster and lifting Ergonomics RULE & REBA- Unsafe act & Unsafe Condition- Electrical Hazards- Crane SafetyToxic gas Release.

UNIT V HAZARD IDENTIFICATION TECHNIQUES 9

Job Safety Analysis-Preliminary Hazard Analysis-Failure mode and Effects Analysis- Hazard and Operability- Fault Tree Analysis- Event Tree Analysis Qualitative and Quantitative Risk Assessment Checklist Analysis- Root cause analysis- What-If Analysis- and Hazard Identification and Risk Assessment.

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Total Periods : 45

At the end of the course, the students will be able to

CO1: Understand the basic concept of safety.

CO2: Obtain knowledge of Statutory Regulations and standards.

CO3: Know about the safety Activities of the Working Place.

CO4: Analyze on the impact of Occupational Exposures and their Remedies

CO5: Obtain knowledge of Risk Assessment Techniques.

Text Books:

1. R.K. Jain and Prof. Sunil S. Rao Industrial Safety, Health and Environment Management Systems KHANNA PUBLISHER
2. L. M. Deshmukh Industrial Safety Management: Hazard Identification and Risk Control McGraw-Hill Education

References Books:

1. Frank Lees (2012) 'Lees' Loss Prevention in Process Industries. Butterworth-Heinemann publications, UK, 4th Edition
2. John Ridley & John Channing (2008)Safety at Work: Routledge, 7th Edition.
3. Dan Petersen (2003) Techniques of Safety Management: A System Approach.
4. Alan Waring.(1996).Safety management system: Chapman &Hall, England
5. Society of Safety Engineers, USA

Online Resources:

1. ISO 45001:2018 occupational health and safety (OH&S) International Organization for Standardization https://www.iso.org/standard/63787.html
2. Indian Standard code of practice on occupational safety and health audit https://law.resource.org/pub/in/bis/S02/is.14489.1998.pdf
3. Indian Standard code of practice on Hazard Identification and Risk Analysis IS 15656:2006 https://law.resource.org/pub/in/bis/S02/is.15656.2006.pdf

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