ANNAMACHARYA INSTITUTE OF TECHNOLOGY ANDSCIENCES, TIRUPATI
(AUTONOMOUS)

Year: III **Semester: V** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20APC0211	ELECTRICAL MACHINES - III	3	0	0	3

COURSE OUTCOMES:

On the completion of this course the student will be able to:

1. Acquire knowledge on construction and operation of brushless D.C motor.
2. Understand construction and operation of PMSM.
3. Acquire knowledge on synchronous and switched reluctance motors.
4. Acquire knowledge of other modern special machines.

UNIT I PERMANENT MAGNET BRUSHLESS D.C. MOTORS 9
Fundamentals of Permanent Magnets -Construction-Principle of operation – Magnetic circuit analysis – EMF and torque equations – Performance characteristics - Closed loop control– Applications

UNIT II PERMANENT MAGNET SYNCHRONOUS MOTORS 9
Principle of operation – EMF and Torque equations – Phasor diagram – Performance characteristics – Closed loop control– Applications.

UNIT III SYNCHRONOUS RELUCTANCE MOTORS 9
Constructional features – Types – Axial and Radial flux motors – Operating principles – Phasor diagram- Voltage and Torque Equations - Performance Characteristics – Applications.

UNIT IV SWITCHED RELUCTANCE MOTORS 9
Constructional features – Principle of operation – Torque production - Power Converters and their controllers – Performance Characteristics – Closed loop control – Applications.

UNIT V OTHER SPECIAL MACHINES 9
Constructional features – Principle of operation and characteristics of : Stepper Motor, Hysteresis motor, AC series motors, Linear motor, Hybrid motor, Polyphase induction motors, premium efficiency motors.

TEXT BOOKS:

1. K. Venkataratnam, ‘Special Electrical Machines’, Universities Press (India) Private Limited, 2008.
2. T. Kenjo, ‘Stepping Motors and Their Microprocessor Controls’, Clarendon Press London, 1984.
3. E.G. Janardanan, ‘Special electrical machines’, PHI learning Private Limited, Delhi, 2014.

REFERENCES:

1. R. Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.
2. T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London, 1988.
3. T. J. E. Miller, 'Brushless Permanent-Magnet and Reluctance Motor Drives', Oxford University Press, 1989.
4. Energy-Efficient Electric Motors, Revised and Expanded by Ali Emadi, 3rd Edition, ISBN 9780824757359, Published August 30, 2004 by CRC Press.
4. R.Srinivasan, 'Special Electrical Machines', Lakshmi Publications, 2013.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO1: Engineering knowledge	1.3	1.3.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY ANDSCIENCES, TIRUPATI
(AUTONOMOUS)

Year: III **Semester: V** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20APC0212	POWER ELECTRONICS	3	0	0	3

Course Outcomes:

1. Understand the basic operating principles of power semiconductor switching devices.
2. Analyze the operation of AC-DC and DC to DC converters and their control.
3. Analyze the operation of DC-AC and AC to AC converters and their control.
4. Understand the operation of cycloconverters.

UNIT-I
POWER SEMICONDUCTOR DEVICES

Basic structure and switching characteristics of Power Diode, Power Transistor, Power MOSFET, IGBT and GTO.SCR-Basic Operation, VI characteristics, Turn-on, Turn-off methods, Switching characteristics, Combination of SCRs, Snubber circuits, Ratings and Protection circuits.

UNIT-II
AC-DC CONVERTERS

Principles of Phase control - Natural commutation - Operation of single-phase half and full wave-controlled converters with R, RL, RL+FWD, RLE Loads - Operation of three phase half wave-controlled converters and full wave-controlled converters with R, RL loads - Effect of source inductance on single phase and three phase-controlled converters - Operation of dual converters.

UNIT-III
DC-DC CONVERTERS

Analysis and design of DC-to-DC converters- Control of DC-DC converters- Buck Converters- Boost converters- Buck-Boost converters- Cuk converters – Principles of chopper - Classification and operation of Choppers (A, B, C, D and E) - Introduction to Resonant converters – Effect of EMI on converters.

UNIT-IV
DC-AC CONVERTERS

Single phase and Three phase inverters - Voltage source and Current source inverters-120° and 180° mode operation of 3 phase inverter – Single Pulse Modulation- Multiple Pulse Width Modulation- SPWM- Space Vector Modulation- Harmonic Elimination Techniques.

UNIT-V
AC-AC CONVERTERS

AC to AC power conversion using voltage controllers. Single phase and Three Phase AC-AC controllers – single phase step up, step down cycloconverters – three phases to single phase and three phase to three phase cycloconverters.

Text Books:

1. M. H. Rashid, Power Electronics: Circuits, Devices and Applications, Prentice Hall of India 3rd Edition, 2014.
2. Theory of Power Electronics, "K.L.Rao, C.H.SaiBabu - S.Chand& Company Ltd.", New Delhi.- 2006

References:

1. M. D. Singh & K. B. Kanchandhani, "Power Electronics", Tata McGraw – Hill Publishing Company, 2nd Edition, 2010.
2. N.Mohan, T.M.Undeland, W.P.Robbins, "Power Electronics, Converters and Applications & Design",3rd Edition John Wiley & sons.
3. Dr P S Bimbhra "Power Electronics ", Khanna Publishers, New Delhi, Edition 2012.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO2: Problem analysis	2.4	2.4.1
CO3	PO2: Problem analysis	2.4	2.4.1
CO4	PO1: Engineering knowledge	1.3	1.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY ANDSCIENCES, TIRUPATI (AUTONOMOUS)

Year: III **Semester: V** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20APC0213	CONTROL SYSTEMS	3	0	0	3

Course Outcomes:

1. Formulate mathematical model and transfer function of the physical systems.
2. Determine the stability of linear systems in time domain.
3. Perform frequency domain analysis using bode and polar plot.
4. Formulate and design state-space analysis.

UNIT - I
CONTROL SYSTEMS CONCEPTS
Basic elements of control systems- open and close loop systems - Transfer function – Modelling of Electrical systems and mechanical systems – Block diagram reduction techniques – Signal flow graphs.

UNIT-II
TIME RESPONSE ANALYSIS
Step Response - Impulse Response - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

UNIT- III
STABILITY ANALYSIS IN TIME DOMAIN
Stability - concept and definition, Characteristic equation – Location of poles – Routh Hurwitz criterion - The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT- IV
FREQUENCY RESPONSE ANALYSIS
Bode plot - Correlation between frequency domain and time domain specifications-Bode Diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots - Polar Plots-Nyquist Plots- Phase margin and Gain Margin – Stability Analysis.

UNIT- V
STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS
Concepts of state, state variables and state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model-State Transition Matrix and it's Properties-System response through State Space models-The concepts of controllability and observability, Duality between controllability and observability.

TEXT BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering", 5th edition, Prentice Hall of India Pvt. Ltd., 2010.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering" 5th edition, New Age International (P) Limited Publishers, 2007.

REFERENCE BOOKS:

1. M. Gopal, "Control Systems Principles & Design" 4th Edition, Mc Graw Hill Education, 2012.
2. B. C. Kuo and Farid Golnaraghi, "Automatic Control Systems" 8th edition, John Wiley and sons, 2003.
3. Joseph J Distefano III, "Feedback and Control Systems", Allen R Stubberud & Ivan Williams, 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
4. Graham C. Goodwin, "Control System Design" Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Gene F. Franklin, "Feedback Control of Dynamic Systems", J.D. Powell and Abbas Emami- Naeini, 6th Edition, Pearson, 2010.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO2: Problem analysis	2.4	2.4.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO4: Conduct investigations of complex problems	4.3	4.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES: TIRUPATI
(AUTONOMOUS)
AK20 Regulations

Year: III Semester: FIFTH Branch of Study: EEE

Course Code	Course Title	L	T	P	Credits
20APC0425	ANALOG AND DIGITAL IC APPLICATIONS	3	1	0	3

Course Outcomes:
CO1: Understand the basic building blocks of linear integrated circuits and its characteristics.
CO2: Design the Multivibrator circuits using IC555 and determine the frequency of oscillation and time delay, and understand the concept of A/D and D/A Converters.
CO3: Understand the concept of active filters and oscillators.
CO4: Design of CMOS logic circuits and analysis of performance characteristics.
CO5: Implementation of digital logic circuits with the estimation of power and speed.

UNIT I
OP-AMP CHARACTERISTICS: Basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics - DC and AC characteristics, 741 Op-amp and its features, modes of operation-inverting, non-inverting, differential. Basic applications of Op-amp, instrumentation amplifier, AC amplifier, V to I and I to V converters, sample & Hold circuits, multiplier and divider, Differentiator and Integrator, Comparators, Schmitt trigger, multivibrator.

UNIT II
TIMERS, D-A AND A-D CONVERTERS: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. Basic DAC techniques, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel comparator type ADC, Counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC specifications.

UNIT III
ACTIVE FILTERS & OSCILLATORS: Introduction, 1^{st} order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation- RC, Wien, and quadrature type, waveform generators-triangular, sawtooth, square wave and VCO.

UNIT IV
CMOS LOGIC: introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

UNIT V
INTIGRATED CIRCUITS: Classification, Chip size and circuit complexity, Classification of integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector o/ps, Tristate TTL, MOS & CMOS open drain and tri- state outputs, CMOS transmission gate, IC interfacing-TTL driving CMOS & CMOS driving TTL.

Text Books:

1. Linear Integrated Circuits – D.RoyChowdhury, New Age International (p) Ltd, 2nd Edition., 2003.
2. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.

Reference Books:

1. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications – Denton J.Daibey, TMH.
2. Design with Operational amplifiers & Analog Integrated circuits-Sergio Franco, Mc Graw Hill, 3rd Edition , 2002.
3. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition 2005.
4. Op-amps & Linear ICs – RamakanthA.Gayakwad, PHI, 1987.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Engineering knowledge	1.3	1.3.1
CO: 2	PO 2: Problem analysis	2.1	2.1.2
CO: 3	PO 3: Design/Development of Solutions	3.4	3.4.2
CO: 4	PO 4: Conduct investigations of complex problems	4.3	4.3.2
CO: 5	PO 4: Conduct investigations of complex problems	4.3	4.3.3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Year: III **Semester: V** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20APE0201	**POWER SYSTEMS - II**	**3**	**0**	**0**	**3**

COURSE OUTCOMES:

1. Understand the classification and parameters of conductors, transmission lines.
2. Analyze power system transients and the effect on power systems.
3. Understand the factors governing the performance of transmission lines.
4. Analyze the properties of overhead lines and their types.
5. Understand the types and construction of underground cables.

UNIT-I: TRANSMISSION LINE PARAMETER

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT-II: PERFORMANCE OF SHORT, MEDIUM AND LONG LENGTH TRANSMISSION LINES:

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks. Long Transmission Line-Rigorous Solution, evaluation of A, B, C, D Constants, Interpretation of the Long Line Equations -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves.

UNIT – III POWER SYSTEM TRANSIENTS & FACTORS GOVERNING THE PERFORMANCE OF TRANSMISSION LINES

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples). Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

UNIT-IV OVERHEAD LINE INSULATORS & SAG, TENSION CALCULATIONS:

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding. Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT-V UNDERGROUND CABLES

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress. Capacitance of Single and 3-Core belted cables. Grading of Cables - Capacitance grading, Description of Inter-sheath grading, HV cables.

TEXT BOOKS:

1. Electrical power systems, C.L.Wadhwa, New Age International (P) Limited, Publishers.
2. Electrical Power Systems, PSR. Murty, BS Publications.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. A Textbook of Power System Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
3. Electrical Power Generation, Transmission and Distribution, S.N.Singh, PHI.
4. Principles of Power Systems**,** V. K Mehta and Rohit Mehta S. Chand Company Pvt. Ltd.
5. Power System Engineering, I.J.Nagarath & D.P Kothari , TMH.
6. Power System Analysis and Design, Dr. B. R. Gupta, S. Chand & Company Limited.
7. Power System Analysis, Operation and control, Abhijit Chakrpabarti, Sunitha Halder, PHI, 3/e, 2010
8. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC Press (Taylor & Francis Group) Special Indian Edition,2/e.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO2: Problem analysis	2.4	2.4.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO5	PO1: Engineering knowledge	1.3	1.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI

(AUTONOMOUS)

Year: III **Semester: V** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20APC0214	**Control Systems Lab**	**0**	**0**	**3**	**1.5**

Course Outcomes:

1. Acquire knowledge of feedback control and transfer function of DC servo motor.
2. Familiarize mathematical modelling of systems and design controllers and compensators.
3. Get the knowledge on transient and steady state behaviour of second order systems.
4. Determine the performance and time domain specifications of first and second order systems.
5. Implement MATLAB analysis to real life systems.

Any Eight of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros.
3. Programmable logic controller - Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC Machine
6. Effect of P, PD, PI, PID Controller on a second order system
7. Lag and lead compensation - Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor

Any two simulation experiments are to be conducted:

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. State space model for classical transfer function using MATLAB - Verification.

REFERENCE BOOKS:

1. M.H.Rashid, "Simulation of Electrical and electronics Circuits", using PSPICE ,M/s PHI Publications.
2. PSPICE A/D user's manual - Microsim, USA.
3. PSPICE reference guide - Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Math works, USA.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
	PO2: Problem analysis	2.3	2.3.1
			2.3.2
CO3	PO1: Engineering knowledge	1.3	1.3.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO5	PO5: Modern tool usage	5.1	5.1.1
		5.2	5.2.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Year: III Semester: V Branch of Study: EEE

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20APC0215	Power Electronics Lab	0	0	3	1.5

Course Outcomes:

1. Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
2. Analyze the operation of single-phase half & fully-controlled converters and inverters with different types of loads.
3. Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cyclo-converters with different loads.
4. Create and analyze various power electronic converters using MATLAB software.

Any Eight of the Experiments in Power Electronics Lab

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's: (a) R triggering (b) R-C triggering
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. Single Phase Half controlled converter with R load
10. Three Phase half-controlled bridge converter with R-load
11. Single Phase series inverter with R and RL loads
12. Single Phase Bridge converter with R and RL loads
13. Single Phase dual converter with RL loads

Any two simulation experiments with MATLAB

14. Simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
15. Simulation of resonant pulse commutation circuit and Buck converters and chopper.
16. Simulation of single-phase Inverter with PWM control.

REFERENCE BOOKS:

1. O.P. Arora, "Power Electronics Laboratory: Theory, Practice and Organization (Narosa series in Power and Energy Systems)", Alpha Science International Ltd., 2007.
2. M.H.Rashid, "Simulation of Electric and Electronic circuits using PSPICE", M/s PHI Publications.
3. MATLAB and its Tool Books user's manual and - Math works, USA.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
	PO2: Problem analysis	2.4	2.4.2
CO3	PO1: Engineering knowledge	1.3	1.3.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO5: Modern tool usage	5.1	5.1.1
		5.2	5.2.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY ANDSCIENCES, TIRUPATI (AUTONOMOUS)

Year: III **Semester: V** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20ASC0202 (Skill oriented course)	**INTRODUCTION TO PROGRAMMING WITH MATLAB**	**1**	**0**	**2**	**2**

COURSE OUTCOMES:

1. Learn fundamental computer programming concepts such as variables, control structures, functions and many others.
2. Learn about various data types and how to handle them in MATLAB.
3. Learn the powerful support MATLAB provides for working with matrices.
4. Learn about file input/output.

MODULE-1

Introduction - Running MATLAB - The MATLAB Desktop - MATLAB as a Calculator - Syntax and Semantics - Help - Plotting

MODULE-2

Introduction to Matrices and Operators - The Colon Operator - Accessing Parts of a Matrix - Combining and Transforming Matrices - Arithmetic

MODULE-3

Introduction to Functions - Function I/O - Formal Definition of Functions - Subfunctions - Scope - Advantages of Functions - Scripts

MODULE-4

Introduction to Programmer's Toolbox - Matrix Building - Input / Output - Plotting - Debugging

MODULE-5

Selection - If-Statements, Continued - Relational and Logical Operators - Nested If-Statements - Variable Number of Function Arguments - Robustness - Persistent Variables

MODULE-6

Loops - For-Loops - While-Loops - Break Statements - Logical Indexing - Preallocation

MODULE-7

Introduction to Data Types - Character Arrays - Structs - Cells - The String Type (Introduced in 2017a) - The Datetime and Duration Types (Introduced in 2014b)

MODULE-8

File Input/Output - Excel Files - Text Files - Binary Files

REFERENCE & TRAINING RSOURCE: Coursera course "INTRODUCTION TO PROGRAMMING WITH MATLAB"

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: TIRUPATI
(Autonomous)
AK20 Regulations

II & III.B.Tech **Branch: Common to ALL**

Subject Code	Subject Name	L	T	P	Credits
20AMC9901	BIOLOGY FOR ENGINEERS	3	0	0	0

Course Outcomes:

1. Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
2. Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.
3. Brief about human physiology.
4. Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
5. Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.

Unit I: Introduction to Basic Biology (10 hrs)

Evolution: Different patterns of evolution, Darwin's theory of evolution, Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification, Tissue Engineering.

Unit II: Introduction to Biomolecules (10 hrs)

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Unit III: Human Physiology (08 hrs)

Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle, Central Nerves System and Excretory system.

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology (08 hrs)

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. DNA technology. Introduction to gene cloning.

Unit V: Application of Biology (10 hrs)

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, Properties and Classification of virus, Immune response to virus (COVID-2019), Definitions-Pandemic, Epidemic and outbreak, pandemic alert system ranges, Prevention of pandemic disease and pandemic preparation.

Text books:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014.
6. Richard Dawkins, River Out of Eden: A Darwinian View of Life

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 2	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 3	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 4	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 5	PO 1: Apply the knowledge of basic science	1.2	1.2.1