Jabalpur Engineering College, Jabalpur

(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)

(AICTE Model Curriculum Based Scheme)

Bachelor of Technology (B.Tech.) III Semester (Electronics & Tele Communication Engineering)

w.e.f. July 2023

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical			L	T	P	
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work					
1	MA32	BSC	Mathematics-III	70	20	10	-	-	100	3	1	-	4
2	CH32	HSMC	Energy & Environmental Engineering	70	20	10	-	-	100	3	1	-	4
3	EC33	PCC	Electronic Devices & Circuits	70	20	10	30	20	150	3	-	2	4
4	EC34	PCC	Signals & Systems	70	20	10	30	20	150	3	-	2	4
5	EC35	PCC	Network Analysis	70	20	10	30	20	150	3	-	2	4
6	EC36	ESC	Electronic Workshop	-	-	-	30	20	50	-	-	4	2
Total				**350**	**100**	**50**	**120**	**80**	**700**	**15**	2	**10**	**22**
7	EC37	DLC	Self-Learning Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	-	-	-	-	8
8	EC38	MC	NSS/NCC/Swatchhata Abhiyan/Rural Outreach	Qualifier									
Additional Course for Honours or Minor Specialization				Permitted to opt for maximum two additional MOOC courses in subject code EC37 for the award of Honours (Minor Specialization).									

Note: MOOC/NPTEL subjects shall be taken with permission of HOD/Coordinator

1 hour lecture (L) = 1 credit	1 hour Tutorial (T) = 1 credit	2 hour Practical (P) = 1 credit

BSC: Basic Science Course, HSMC: Humanities & Social Sciences including Management Course, PCC: Professional Core Course, ESC: Engineering Science Course, MC: Mandatory Course, DLC: Distance Learning Course

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur (M.P.)

(Declared Autonomous by Govt. of Madhya Pradesh and Affiliated to RGPV, Bhopal)

(AICTE Model Curriculum Based Scheme and Syllabus)

Bachelor of Technology (B.Tech.) III Semester, Branch (EE/EC)

COURSE CONTENT **w.e.f. July 2023**

Subject Code	Subject Name	Maximum marks Allotted			Total marks	Hours/Week			Total Credit
MA32	MATHEMATICS-III	Theory			100	L	T	P	4
		End Sem	Mid-Sem Exam	Quiz/ Assignment		3	1	0	
		70	20	10					

Module 1: Transform Calculus-I (06 hours)

Fourier integrals, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms and their elementary properties, Convolution theorem, Application of Fourier transformations to solve the boundary value problems.

Module 2: Transform Calculus-II (10 hours)

Hankel and Mellin transformations with their elementary properties, Application of Hankel and Mellin transformations to solve the boundary value problems, Wavelet transforms, CWT, properties of CWT, Z- transform and inverse Z-transform of elementary functions, Shifting theorems, convolution theorem, Initial and final value theorem.

Module 3: Basic Probability (08 hours)

Probability spaces, Counting techniques, Probability measure, Conditional probability and Baye's theorem, Random variable and distribution function, Moment, Expected value and Variance of Random variables, Chebychev Inequality, Moment generating function. Bivariate discrete and continuous random variables, Independence of random variables.

Module 4: Probability Distributions (08 hours)

Measures of Central tendency: Moments, Skewness and Kurtosis. Discrete Distributions (Binomial, Poisson's distribution) Continuous Distributions (Normal, Exponential Distribution).

Module 5: Applied Statistics (08 hours)

Curve fitting by the method of least squares- Fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means and difference of standard deviations.

Books References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 35th Edition, 2010.
2. S. Ross, A First Course in Probability, 6th Edition, Pearson Education India 2002.
3. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edition, Wiley 1968. Statistics
4. Advanced Engineering Mathematics by B.S. Grewal, Khanna Publishers.
5. Higher Engineering Mathematics by B.V. Ramana TMH.
6. Prasanna Sahoo, Probability and Mathematical Statistics, Louisville KY 40292 USA.

Course Outcomes:

At the end of the course the students will able to :

1. Understand the knowledge of transform calculus.
2. Solve the Boundary value problems by the using transform methods.
3. Determine the concept of Basic probability.
4. Apply probability distribution and statistics in various techniques dealing with engineering problems.

Dr. O.P. Chauhan
H.O.D.
Deptt. of App. Mathematics

DEAN
Academic
JEC, Jabalpur (M.P.)

JABALPUR ENGINEERING COLLEGE, JABALPUR (M.P.)
(Declared Autonomous by MP Govt. Affiliated to RGPV, Bhopal)

(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) III Semester
Branch- Common to (CE/EE/EC/CSE/IT/IP/AI&DS /MT)
COURSE CONTENTS

w.e.f. July 2023

Subject Code	Subject Name	Maximum Marks Allotted			Total Marks	Hours/Week			Total Credits
CH32	Energy & Environmental Engineering	Theory							
		End Sem	Mid-sem Exam	Quiz/ Assignment		L	T	P	4
		70	20	10	100	3	1	-	

Module 1:

A. **Introduction to Energy Science:**
World & Indian Energy Scenario, Overview to Energy Systems, Energy sustainability and Environment. Fossil Fuels. Alternatives for fossil fuels: biomass, wind, solar, nuclear, wave, tidal, hydrogen & geothermal energy.

B. **Batteries:**
Classification of Batteries, Important Applications, Lead-Acid battery, Ni-Cd battery & Li battery. Fuel Cell: Hydrogen-Oxygen Fuel cell.

Module2: Environmental Pollution A:

I. Air Pollution
Causes, Effects & Control Measures of Air Pollution: Primary and Secondary air pollutants and photo-chemical smog. Climate changes, Global warming, Ozone layer depletion. Pollution case studies: Bhopal gas Disaster and London smog Disaster.

II. Water Pollution
Definition, Causes, Effects and Control Measures (Primary & Secondary waste water treatment), Acid Rain and Marine pollution. Pollution case studies: Minamata Tragedy, Ganga Action Plan, Major oil spills of the 20^{th} & 21^{st} century. Water conservation, Rain water harvesting and Water Shed Management.

III. Noise Pollution
Causes, Effects & Control Measures.

Module3: Environmental Pollution B:

I. Sources, Adverse effects and Control measures of Soil Pollution, Thermal Pollution, Nuclear Pollution & Nuclear hazards. Major case studies.

II. Solid waste management: Municipal Solid Waste (MSW), Collection and disposal methods. Disaster Management.

III. Introduction to carbon footprint, ways to reduce carbon footprint, Carbon trading.

Module 4: Ecosystem & Biodiversity:

Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Introduction ,Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: Biodiversity at global & National levels; 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 conservation of biodiversity. Environment Protection Act.

Module 5: Corrosion & its prevention:

Theories of Corrosion and Mechanism – Dry (Direct Chemical attack), Wet (Electro Chemical Theory) Atmospheric corrosion, Galvanic Series, Galvanic and Concentration Cell Corrosion, Corrosion by sea water. Factors Influencing and Control of Corrosion – Proper Design, Use of pure metal and metal alloys, passivity, cathodic protection – Sacrificial anode and Impressed Current. Modifying the environment, Use of inhibitors.

Protective coatings:

Hot dipping, Electroplating, Metal spraying metal cladding & cementation.

TEXT BOOKS

1. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi
2. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.
3. A text book of Environmental Chemistry and Pollution control by S.S. Dara & Dr. D. D. Mishra, S. Chand & Co, New Delhi
4. Energy,Environment Ecology and Society by Dr.Pushpendra,Vayu Education of India New Delhi
5. Energy, Environment Ethics and Society, by Dr.S.Deswal & Dr.A.Deswal Dhanpat Rai Publishing Company, New Delhi

REFERENCE BOOKS

1. J.C. Kuriakose and J. Rajaram, "Chemistry in Engineering and Technology", Vol.1 & 2, Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi
2. Mars G. Fontana, "Corrosion Engineering", Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi.
3. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
4. J.P.Gupta, A Text book of Energy, Environment Ethics & Society" Dhanpat Rai Publishing Company.

JABALPUR ENGINEERING COLLEGE, JABALPUR (M.P.)
(Declared Autonomous by MP Govt. Affiliated to RGPV, Bhopal)

COURSE OUTCOME: At the end of the course the student will be able to

CO1	Apply the concept of sustainability of renewable energy to overcome the shortcoming of energy from non-renewable sources. Understanding of Energy devices.
CO2	Develop an understanding related to Water, Air and Noise pollution.
CO3	Understand the importance of Soil, Thermal and Nuclear pollution. Illustrate municipal practices in solid waste management. Define carbon footprints.
CO4	Understand the interrelationship of different species in variety of ecosystems. Conservation of Biodiversity & awareness of Environmental protection Act.
CO5	Recognize the origin as well as types of corrosion and apply appropriate protection mechanism to control corrosion.

DEAN
Academic
JEC, Jabalpur (M.P.)

Prof & Head
Applied Chemistry Deptt
Govt Engineering College
JABALPUR-482011

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) III Semester (Electronics & Telecommunication Engg.)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
EC33	Electronic Devices & Circuits	Theory			Practical						
		End Sem	Mid-Sem Exam	Quiz/ Assignment	End Sem	Lab work		L	T	P	4
		70	20	10	30	20	150	3	-	2	

MODULE-I Semiconductor Physics
Semiconductor materials: Covalent bond and intrinsic materials, extrinsic materials: p-type and n-type semiconductors, Energy Bands in Semiconductors, Fermi Energy Level, Energy Density, Charge Carriers in Semiconductor, Carrier Concentration, Generations and Recombination of Carriers, Mass Action Law, Drift and Diffusion current, Mechanism of Current flow in Semiconductor, Mobility and Resistivity, The Einstein Relationship, Hall Effect

MODULE-II P-N Junction Diode & Circuits
Semiconductor diodes: Open circuited P-N Junction, Energy band diagram of an open circuit P-N junction, V-I characteristic of P-N junction diode and its temperature dependence, Diode resistance, The current components in an P-N junction diode, Junction capacitances, Diode switching times. Practical Applications of diode circuits: Half-wave & Full wave rectifier, Clippers, Clampers, Voltage multiplier circuits.
Special types of Diodes: Zener Diode, Zener Diode as voltage regulators, PIN Diode, Schottky Diode, Varactor Diode, Tunnel Diode, Light emitting diode (LED)
Photo-conductive Devices- Photoconductive cells & Photodiodes, Photovoltaic effect and Solar cells, Thermistors, Sensistors, Barretters, Thyristors- SCR, TRIAC, DIAC.

MODULE-III Junction Transistors- BJT
Bipolar Junction Transistors: Transistor construction and basic operation, Transistor Amplifying action, Current components in a BJT, Common-base configuration & characteristic, Early effect and Base width Modulation, Common-Emitter configuration & characteristic, Common collector configuration & characteristic, Ebers-moll model.
DC-biasing of Bipolar Junction Transistors: DC Load Line & Operating point, Fixed biased configuration, Emitter-bias configuration, Voltage divider bias configuration, collector feedback configuration, Emitter follower configuration, bias stabilization of transistors.
AC analysis of Bipolar Junction Transistors: BJT Transistor modeling, re Transistor model of Common-Emitter fixed bias configuration, voltage divider bias, CE emitter-bias, Emitter follower, Common-base, Collector feedback , Collector DC feedback configuration, Current gain, effect of RL and RS, Two port System Approach, cascaded systems, Hybrid equivalent model, approximate hybrid equivalent circuits, Hybrid π model.

MODULE-IV Amplifiers
Differential amplifier: Calculation of differential and common mode gain, CMRR using h-parameters Darlington connection, Bootstrap technique, cascade and cascode amplifier.
Feedback amplifier: Negative feedback, various feedback topologies
Oscillators: Positive feedback, Sinusoidal oscillators, L-C (Hartley-colpitt's) oscillators, RC phase shift oscillators, Wien's bridge and crystal oscillators.
Power Amplifier : Series-fed Class A amplifier, Transformer-Coupled Class A amplifier, Class B amplifier operation, Class B push-pull amplifier, Amplifier distortion, Class C amplifier, their efficiency and power dissipation.

MODULE-V: Junction Field – Effect Transistors

Junction Field - Effect transistor (JFETs): Device Structure and Physical Operation, Current-Voltage Characteristics,

MOSFETs: Enhancement type (n-Channel, p-Channel) MOSFET, Depletion type (n-Channel, p-Channel) MOSFET, The MOSFET as an Amplifier and as a Switch, Biasing in MOS Amplifier Circuits, Small Signal Operation and Models of JFET & MOSFET, Comparison of JFETS & MOSFETs.

Text Books:

1. Jacob Millman, Christos C. Halkias, "Integrated Electronics", McGraw Hill Publications, 1992.
2. Boylestad R. and Nashelsky L., "Electronic Devices & Circuit Theory", PHI, 10th Edition.
3. Ben G. Streetman, S K Banerjee : "Solid State Electronic Devices"
3. Albert Malvino & David J. Bates, "Electronic Principles", Tata McGraw Hill, 7th Edition 2007
4. Floyd, "Electronic Devices", PHI, 7th Edition.

Reference Books:

1. SedraA.S .and Smith K.C., 'Microelectronic Circuits', Oxford University Press, fifth edition, 2004.
2. Paul Horowitz and Winfield Hill, 'The art of electronics', Cambridge university press, third edition, 2011.

Course Outcomes:

Upon successful completion of course, students will be able to:

CO1	Understand the Physics of semiconductor Devices
CO2	Understand the behavior of PN junction Diode and applications of Diode
CO3	Analyze the behavior of Transistor and different biasing techniques of Transistors as well as ac behavior
CO4	Analyze the various types of Transistor amplifiers
CO5	Classify and understand the physics of various types of FETs

List of Experiments : (Expandable)

1. To Plot the V-I Characteristics of P-N Junction diode (Si & Ge) and find the cut-in voltage.
2. To Plot the V-I Characteristics of Zener diode and find the maximum reverse breakdown voltage
3. To plot the characteristics of a Silicon Controlled rectifier.
4. To design half wave, full wave and Bridge Rectifier and find peak inverse voltage, Efficiency and ripple factor in each circuit.
5. To design various clipper & clamper circuit.
6. To Plot Transistor characteristics in common base and common emitter configurations.
7. To design and compare various transistor biasing techniques.
8. To plot the drain characteristics of n-channel (p-channel) JFET and find the pinch-off voltage.
9. To plot the drain Characteristics of n-channel (p-channel) Enhancement and n-channel (p-channel) Depletion MOSFET
10. To design Class A power amplifier & Class –B push-pull power amplifier.

Dr. BHAVANA JHARIA
Reader, Dept. of Electronics & Telecommunications Engg.
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

Electronics & Telecom. Deptt
Jabalpur Engineering College
JABALPUR (M. P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) III Semester (Electronics & Telecommunication Engg.)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
EC34	Signals & Systems	Theory			Practical			L	T	P	4
		End Sem	Mid-Sem Exam	Quiz/ Assignment	End Sem	Lab work					
		70	20	10	30	20	150	3	-	2	

MODULE-I Signals and Systems.

Signals: Classification of signals, Continuous-Time and Discrete-Time Signals, Periodic andAperiodic, Even and Odd,Causal and Non-Causal, Deterministic and Random, Energy andpower signals, Energy Theorem, Power Theorem, Cross-correlation,auto-correlation, ESD, PSD, Singularity Functions.

Systems: Classification of System and Basic System Properties, System with & without memory, inevitability& inversesystem, Causality, Stability, Time-Invariance, Linearity.LTI system: Response, Convolution Integral, Properties & Eigen Function of LTI system, System described by differenceand differential equation.

MODULE-II Fourier analysis of Signals

Fourier series: Fourier series representation of Continuous-Time periodic signals, convergence & properties of Continuous-Time Fourier series, Fourier series representation of Discrete-Time periodic signals, properties of Discrete-Time Fourier series, Fourier series and LTI systems

Fourier transforms: Representation of Aperiodic signals, Continuous-Time Fourier transform, Discrete-Time Fouriertransform, Spectrum plot, Fourier transform of periodic signal, Properties and Applications of Fourier transform(Hilberttransform), Frequency Response of LTI Systems.

MODULE-III Laplace Transform

Laplace transform, Region of Convergence, Inverse Laplace Transform, Properties of LaplaceTransform, Applications of Laplace Transform, Laplace Transform of Some Common Signals,Unilateral Laplace transform, Relation between different transforms.

MODULE-IV Sampling

Sampling theorem, Reconstruction of original signals from its samples, Alising, Anti-alising, Interpolation, Sample & HoldCircuit, Multirate Sampling, Sampling of band-pass signals, Discrete-time processing of Continuous-time Signals,Sampling of discrete time signals.

MODULE-V Z-Transform

Z-Transform, Region of Convergence, Inverse Z-Transform, Properties of Z-Transform, Applications of Z-Transform, Analysis and Characteristic of LTI Systems using Z-Transform, System Function Algebra and Block DiagramRepresentation, Unilateral Z-Transform.

Reference books:

1. Oppenheim, Willsky and Nawab: Signals and Systems, PHI

2. Simon Haykins, B.V.Vean: signals and systems, John Wiley & Sons, Inc.

3. H. P. Hsu: Schaum's Outline of & Systems, MGH

4. David McMahon: Signals and Systems demystified, MGH

5. B.P.Lathi: Linear Systems & Signals, Oxford Series

Course Outcomes:

Upon successful completion of course students will be able to:

CO1	Classify various types of Signals and Systems
CO2	Transform signal from time domain to frequency domain
CO3	Analyze various transforming technique
CO4	Convert signal from continuous to discrete form
CO5	Apply various transforming techniques

SIGNAL & SYSTEMS LAB

1. To plot the basic step, ramp and parabolic signal.

2. To plot the signal after applying shifting, compressing and expanding.

3. To plot the signal after time manipulation and frequency manipulation

4. To verify Even and Odd Symmetry of Signals.

5. To check for linearity, causality and stability for a given system

6. To perform sampling rate conversion for any given arbitrary sequence or signal by interpolation, up sampling, down sampling and resampling

7. To find impulse and step response of a given system.

8. Synthesis of signals using Fourier Series.

9. Convolution on Continuous Time Signals.

10. Transformation of signals into time and frequency domains.

Dr. BHAVANA JHARIA
Reader, Dept. of Electronics
& Telecommunications Engg.
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

Electronics & Telecom. Deptt
Jabalpur Engineering College
JABALPUR (M. P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) III Semester (Electronics & Telecommunication Engg.)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
EC35	Network Analysis	End Sem.	Mid-Sem. Exam	Quiz/ Assignment	End Sem.	Lab work	150	L	T	P	4
		70	20	10	30	20		3	-	2	

Module I:
Network topology, graph matrices, formulation and solution of circuit equations based on graph theory using different analysis techniques- circuit, cut set and mixed. Concept of duality.

Module II:
Frequency response:Resonance, Q – factor, bandwidth. Magnetically coupled circuits: Mutual Inductance, Self-Inductance, The Dot Convention, Reflected Impedance, T and πEquivalent Networks.

Module III:
Transient and steady state analysis of first order system, response of RL, RC system for different input signal.Transient and steady state analysis of second order system, Response of LC, RLC

Module IV:
Laplace Transformation and its Application in Circuit Analysis. Solution of Integro-differential equations, Time and Frequency domain analysis of circuits for step, ramp, exponential and damped exponential inputs, Laplace transform method and complex frequency approach.

Module V:
Introduction, network element, Classification of network, network configuration, recurrent network, z-parameter, y-parameter, h-parameter, ABCD- parameter. Condition of reciprocity and symmetry, inter-relationships, interconnections, image impedances.

Text Books:

1. C. K. Alexander and M. N. O. Sadiku, "Fundamentals of Electric circuits".
2. D. Roy Chaudhary, "Networks and systems", New Age International Publications.

Reference Books:

1. M,E.Vanvalkenburg "Network Analysis" Prentice Hall.
2.W. H. Hayt, Jr., J. E. Kemmerly, Steven M. Durbin, "Engineering Circuit Analysis", TMH.

Course Outcomes:
Upoon successful completion of course student will be able to:

CO 1	Classify various types of signals and system.
CO 2	Transform signals from time domain to frequency domain and its application on circuits.
CO 3	Analyze first and second order circuits.
CO 4	Analyze frequency response and coupled circuits.
CO 5	Analyze two port networks.

List of Experiments:

1. To verify the operation of parallel resonance RLC circuit and measurement of resonance frequency and bandwidth.
2. To verify the operation of series resonance RLC circuit and measurement of resonance frequency and bandwidth.
3. To verify the frequency characteristics of high pass RC circuit.
4. To verify the frequency characteristics of low pass RC circuit.
5. To study of Y parameters & Z parameters of two port T network.
6. To study network theorems in AC circuit. a.Thevenin's, b.Norton's, c.Superposition
7. To study of network functions.

Electronics & Telecom. Deptt
Jabalpur Engineering College

DEAN
Academic
JEC, Jabalpur (M.P.)

Dr. BHAVANA JHARIA
Prof & Head/Reader, Dept. of Electronics
& Telecommunications Engg.
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) III Semester (Electronics & Telecommunication Engg.)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem.	Mid-Sem. Exam	Quiz/ Assignment	End Sem.	Lab work		L	T	P	
EC36	Electronic Workshop	-	-	-	30	20	50	-	-	4	2

Module	Major Practical Learning Outcomes	Topics and Sub-topics
Module– I **Electronic Components, Measuring Instruments and Tools**	1a. Identify a particular component from the given group of passive electronic components	1.1 Passive components: Different types of: resistors, inductors, capacitors, potentiometers, Thermistor, Transformer, auto transformer
	1b. Identify the terminals of active electronic components.	1.2 Active components: Diode, Zener diode, Varactor diode, LED, Photo diode, BJT, Photo transistor, FET, LDR, Solar cell, Photocell, Optocoupler
	1c.Use voltage source. 1d. Use test and measuring instruments.	1.3 Voltage Sources: DC battery (Pencil cell :1.5V, AAA,AA Type, +9V, Rechargeble Cell, Mobile battery) AC power supply, DC power supply 1.4 Measuring Instruments: Different types of Voltmeters, Ammeters, Watt meters, multimeter, LCR-Q meter, CRO, DSO, Function Generator, Frequency counter
	1e. Use electronic workshop tools for building and wiring electronic circuits with necessary safety	1.5 Electronic Workshop Tools: Bread board, Copper clad laminate sheet, Solder iron, solder-stand, solder-wire, flux, flexible wire, hookup wire, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, desolder pump, De-solder wick, drilling machine

DEAN
Academic
JEC, Jabalpur (M.P.)

Module– II **Building, Wiring, Soldering and Testing of Electronic Circuits**	2a. Sketch the standard symbols of various active and passive electronic components 2b. Draw the electronic circuits using standard symbols	2.1 Electronic circuit Drawing • Series and Parallel network using Resistors, Capacitors, T-type/ π-type attenuator, • Circuit diagram for: - forward/reverse biased PN Junction diode - Half wave, Full wave and Bridge Rectifier using diode - characteristics of Zener diode/ LED/ Photo diode/LDR - Transistor characteristics in CE/CB configuration - Zener diode as shunt regulator - Transistorized shunt/ series regulators - +5V, -5V, +/-5V dc regulated power supply using IC 78XX / 79XX with LED indication - LM317 variable voltage regulator - Clipper/Clamper - Low pass filter, High pass filter, Band pass filter, Band elimination filter - Light operated Relay - Transistorized touch control switch - Rain drop detector
	2c. Build/test and troubleshoot electronic circuits on breadboard 2d.Build/test electronic circuits on general purpose PCB	2.2 Electronic circuit on bread board 2.3 Soldering/desoldering, electronic circuit on general purpose PCB
Module– III **Use of Data sheets for Component Selection and Specification**	3a.Find the specification of electronic component from data sheet/data manual. 3b.Select appropriate component for given circuit application. 3c.Select specification of Surface Mount Device (SMD) components as required.	3.1 Manufacturer's Datasheet of: - Diodes IN4001 to 07, IN4148; 2N5402, 2N5408, BY127 - Zener Diode, Photo diode, LED, Varactor diode, Seven segment LED - Transistors BC107, BC177, BC547/548, SL100, SK100, AC127/128, BF194, TIP122, Photo transistor - voltage regulator IC78XX, 79XX, LM317 - Packages of various SMD components: Resistor,

DEAN
Academic
JEC, Jabalpur (M.P.)

		Capacitor, Inductor, Diode-LL4148, SM4007, Chip transistor, Chip Darlington transistor, Bridge rectifier
Module– IV **Schematic, Layout and Tracing of Electronic Circuits**	4a.Create PCB layout manually. 4b.Create schematic and layout of given electronic circuit using any Simple PCB design software. 4c.Trace circuit from given PCB layout on the PCB.	4.1 Manually Prepare PCB layout on graph paper 4.2 PCB design software 4.3 PCB layout - Component side and copper side 4.4 Tracing for PCB Fabrication 4.5 Tracing of circuit on PCB
Module – V **Mini Project**	5a. Fabricate PCB & build the given circuit on the PCB. 5b. Test the assembled circuit on PCB. 5c. Prepare project report in proper format.	5.1 Fabrication of PCB, component mounting, Soldering, testing & troubleshooting of circuits on PCB

Dr. BHAVANA JHARIA
Reader, Dept. of Electronics
& Telecommunications Engg.
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)