Shri Vaishnav Vidhyapeeth Vishvavidhyalaya, Indore

Name of Program: Bachelor of Technology (Railway Engineering)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment *				
BTRW601		Electrical Machines and Drives	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Syllabus

UNIT I

DC Machine: Introduction, construction, types, emf equation, lap and wave windings, various characteristics of shunt, series and compound generators, voltage build up, losses and efficiency, condition for maximum efficiency, Applications

DC Motors: Introduction, principals, back-emf, torque of motor, types, characteristics of shunt, series and compound motors, speed control, losses and efficiency, electric braking of DC motors, Applications.

UNIT II

Induction Machine: Working principle, construction, comparison of slip ring and squirrel cage motors, steady state analysis, phasor diagram and equivalent circuit, power flow diagram, torque-speed and power-speed characteristics, Losses and efficiency. Starting of squirrel cage and slip ring motors, power factor control,

UNIT III

Basic concept of Electric Drives: Elements of drive systems, Requirement of electric drives, Rating & Selection of drives, groups and individual drives, Constant power and Constant torque drives, fundamental torque equation of drive, four quadrant operation of drive, electric barking, plugging, dynamic and regenerative braking operations.

UNIT IV

DC Drives:

Thyristor control operation of drives, single phase semi and fully controlled converters and three phase semi and full converters connected to d.c separately excited and d.c series motors discontinuous and continuous operations, four quadrant operation of d.c motor by dual converter, control of dc motor by single quadrant, two quadrant and four quadrant chopper fed d.c separately excited and series motor, closed loop operation.

UNIT V

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

Induction Motor Drives (rotor and stator side)
Control of induction motor by pole changing method, voltage control method by ac voltage controller, variable frequency control by VSI and CSI and cyclo converters, PWM control, comparison of VSI and CSI operations, closed loop operation of induction motor drives, static rotor resistance control, slip power recovery using scherbius and Kramer drive.

Text Books:

1. Fundamentals of Electrical Drives by G.K. Dubey, Published January 1st 2001 by Alpha Science International, Ltd.
2. Electrical Machinary by P. S Bimbhra, Publisher: Khanna Publishers, Edition: 7th Edition, 2011.

List of Experiments:

1. Design and simulate single phase semi controlled converter fed separately excited DC motor drive.
2. Design and simulate single phase semi controlled full wave converter fed DC series motor drive.
3. Design and simulate single phase fully controlled rectifier fed separately excited DC motor drive.
4. Design and simulate single phase fully controlled converter fed DC series motor drive.
5. Design and simulate three phase fully controlled rectifier fed separately excited DC motor drive.
6. Design and simulate three phase fully controlled converter fed DC series motor drive
7. Design and simulate Class A chopper controlled separately excited DC motor drive
8. Design and simulate Class A chopper controlled DC series motor drive.
9. Design and simulate Class C chopper controlled separately excited DC motor drive.
10. Design and simulate speed control of slip ring induction motor by PWM inverter.

Chairperson
Board of Studies
Shri Vaishnav Vidhyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

Shri Vaishnav Vidyapeeth Vishvavidyalaya, Indore

Name of Program: B. Tech (Railway Engineering)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	ENDSEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTRW602		Railway Safety	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

Course Educational Objectives (CEOs): To familiarize the students with the safety organization, safety rules, duties and there implementation.

COURSE OUTCOMES: Upon completion of the course, the students shall be able to demonstrate following knowledge, skills and attitudes

1. Understand the various railway terminologies.
2. Identifying the unsafe condition and ways to avoid any accidental condition.
3. Understand the various type couplers in Indian Railways.
4. Identifying the various types of joints and welds in Rail.
5. Explain the various braking system in Railways.

Syllabus

UNIT-I **[8 Hours]**

Definitions & Terminologies: Definitions of Rail Terms, Signaling–safety-interoperability: Function of signaling: Evolution of signaling, braking distance significant requirements, traffic safety and regularity, the regularity of the frame work, basic signaling function, semaphore signaling, visual and audible signals, color used in signals, types of signals.

UNIT-II **[8 Hours]**

Coupler and Level Crossings: Introduction, Screw Coupling ,Centre Buffer Coupler, Types of Centre Buffer Coupler Adopted in Indian Railway, Factors Effecting the Performance of CBC, Advantage of CBC, Level Crossings: Classification of Level Crossings Dimensions of Level Crossings, Accidents at Level Crossings and Remedial Measures, Maintenance of Level Crossings, Inspection of Level Crossings by PWI and AEN.

UNIT-III **[6 Hours]**

Points and Crossings: Important Terms, Switches, Design of Tongue Rails, Crossing, Number and Angle of Crossing, Reconditioning of Worn Out Crossings, Turnouts, Turnout with Curved

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

Switches, Layout of Turnout, Trends in Turnout Design on Indian Railways, Inspection and Maintenance of Points and Crossings.

UNIT-I **[8 Hours]**

Rail Joints and Welding of Rails: Effects of a Rail Joint, Requirements of an Ideal Rail Joint, Types of Rail Joints, Welding a Rail Joint, Gas Pressure Welding, Electric or Metal Arc Welding, Flash Butt Welding, Thermit Welding of Rails, Recent Developments in Welding Techniques, Rail Grinding: Benefits of Rail Grinding, Common Rail Grinding Strategies, Grinding Equipment.

UNIT-V **[10 Hours]**

Creep of Rails: Theories for the Development of Creep, Causes of Creep, Effects of Creep, Measurement of Creep, Adjustment of Creep, Creep Adjuster, Portions of Track Susceptible to Creep, Measures to Reduce Creep, Development of Defects: Introduction, Rail Loading And Stressing, Defect Development Identification, Multiple Stage Ruptures, Rail Batter, Miscellaneous Defects.

Text Books:

1. Chandra, S., Agarwal, M.M., "Railway Engineering", Oxford University Press, 2nd Edition, 2013.

References Books:

1. Gupta, B.L.& Gupta, A., "Roads Railways, Bridges, Tunnels & Harbour dock Engineering", Standard Publishers, Delhi, 21th Edition,2009
2. CAMTECH "Fire Causes and Preventive Measures in Railway Coaches", March,2015

Experiment List:

1. Elaborate the Fire Causes and Preventive Measures in Railway Coaches.
2. Analyze the various types wheel defect in Railways.
3. Examine the H type centre buffer coupler.
4. Analyze the main Components of Centre Buffer Coupler.
5. Analyze the various Factors affecting the performance of Centre Buffer Coupler.
6. List the Features of Draft Gears in Railway.
7. Examine the salient feature of Indian railway air brake system.
8. Analyze Rolling stock in Indian Railways.
9. Survey the Derailment in Indian Railways.
10. Summarize the Causes and Effects of Creep in Indian Railways.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

Shri Vaishnav Vidhyapeeth Vishvavidhyalaya, Indore

Name of Program: Bachelor of Technology (Railway Engineering)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment *				
BTRW603		Introduction to Simulation Tool	0	0	0	30	20	0	0	4	2

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Educational Objectives (CEOs):

The objectives are to give the fundamentals of simulation of ac drive system in MATLAB simulink and some basic idea about designing in AutoCAD software.

Course Outcomes (COs):

After the successful completion of this students will be able to

1. Simulate any type of circuit in MATLAB.
2. Simulate any power electronics devices.
3. Design railway tracks.
4. Design basic locomotive structure.

LIST OF EXPERITMENTS

1. Introduction of MATLAB simulink.
2. To Create a model and simulate Sinusoidal PWM inverter.
3. To Create a model and simulate Sinusoidal PWM Induction motor drives.
4. To analyze V/f control of Induction Motor with SPWM Inverter.
5. Introduction of AutoCAD.
6. Railways track designing in AutoCAD.
7. Designing basics of locomotive in AutoCAD.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Name of Program: B. Tech (Railway Engineering)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM UNIVERSITY EXAM	TWO TERM EXAM	TEARCHER ASSESSMENT*	ENDSEM UNIVERSITY EXAM	* TEARCHER ASSESSMENT*				
BTCE 602	DCS	Structural Analysis -II	60	20	20	0	0	3	1	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST-Mid Sem Test

1. COURSE OBJECTIVES (CEOs):

The objectives of the course are

i. To enable the student to have a good grasp of all the fundamental issues in these advanced topics in structural analysis,
ii. To introduce the students to concept of structural stability and advanced methods in structural analysis.

2. COURSE OUTCOMES (COs)

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

i. Analyze determinate and indeterminate structure with side sway
ii. Apply flexibility matrix to analyze any structures related to civil engineering works
iii. Apply stiffness matrix to analyze any structures related to civil engineering works
iv. Fundamentals of plastic analysis and use the same in practical applications.

3. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Sway Analysis	1.1 Differentiate Between, Sway And Non-Sway Frames.	Moment Distribution Method In Analysis Of Frames With Sway, Analysis Of Box Frames, Analysis Of Portals With Inclined

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

	1.2 To Study Different Types Of Support Condition Under Sway Analysis.	Members.
	1.3 To Analyze Rotation Contribution Method.	Analysis of Beams And Frames By Kani's Method.
Unit – II Approximate	2.1 To Study Tall Frames Under Different Loading And Codal Provisions.	Analysis of Tall Frames, Wind And Earthquake Loads, Codal Provisions For Lateral Loads.
	2.2 To Analyze Multistory Frame By Approximate Methods.	Approximate Analysis of Multistory Frames For Vertical And Lateral Loads.
Unit – III Matrix Analysis (Flexibili ty Matrix)	3.1 To Study Fundamentals Of Flexibility Matrix.	Introduction Basic Concepts (Axis And Coordinates) Evaluation Of Flexibility Matrix.
	3.2 To Analyze Continuous Beams Using System Approach.	Analysis of Continuous Beams Using System Approach.
Unit – IV Matrix Analysis (Stiffness Method)	4.1to Study Fundamentals Of Stiffness Matrix.	Introduction Basic Concepts,(Axis And Coordinates) Evaluation Of Stiffness Matrix.
	4.2 To Analyze Continuous Beams Using System Approach.	Analysis of Continuous Beams Using System Approach.
Unit – V Plastic Analysis	5.1 To Study Different Terms Related To Plastic Analysis.	Introduction, Shape Factor, Load Factor, Plastic Hinge.
	5.2 To Analyze Beams And Frame By Plastic Analysis.	Plastic Analysis Of Beams And Frame.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

4. BOOKS

1.Punmai, B.C., Ashok Kumar Jain, "Theory of Structure", Lakshmi Publication.
2.Ramamrutham, "Theory of Structure",
3.Bhavikatti,S.S, Structural Analysis, - Vol 1 and Vol 2,Vikas Publication.
4.Vaidhyanadan, R and Perumal , P, "Comprehensive Structural Analysis-Vol 1 & 2, Lakshmi Publication

5. REFERENCES:

1. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach,

Chapman and Hall, New York.

2. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.

3. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.

4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.

5. Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill

International.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

B. Tech. in Mechanical Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTME 603	DCS	MECHANICAL VIBRATION	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs)

This course provides a fundamental understanding of (A) Vibration and noise in automobiles (B) Design modifications to reduce the vibration and noise (C) Improve the life of components.

Course Outcomes (COs)

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Understand free and forced vibrations of single degree freedom systems.
2. Analyze balancing problems in rotating and reciprocating machinery.
3. Understanding causes, source and types of vibrations in machineries.
4. Gaining knowledge in sources and measurement standard of noise.
5. Ability to design and develop vibrations and noise control systems.

Syllabus

Unit - I

Fundamental Aspects of Vibrations: Definition of Vibration, main causes, advantages and disadvantages; engineering applications of vibration and noise; vector method of representing harmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, work done by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier series analysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped and distributed parameter systems.

Un-damped Free Vibrations: Derivation of differential equation of motion: the energy method, the method based on Newton's second law of motion, and Rayleigh's method. Solution of differential equation of motion: Natural frequency of vibration. Systems involving angular oscillations: compound pendulum.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

B. Tech. in Mechanical Engineering

Unit - II

Damped Free Vibrations: Viscous damping: coefficient of damping; damping ratio; under damped, over damped and critically damped systems; logarithmic decrement; frequency of damped free vibration; Coulomb or dry friction damping; frequency, decay rate and comparison of viscous and Coulomb damping; solid and structural damping; slip or interfacial damping.

Unit - III

Harmonically excited Vibration: One degree of freedom, forced harmonic vibration vector representation of forces; excitation due to rotating and reciprocating unbalance; vibration Isolation, force and motion transmissibility; absolute and relative motion of mass (Seismic Instruments).

Whirling Motion and Critical Speed: Whirling motion and Critical speed: Definitions and significance. Critical – speed of a vertical, light – flexible shaft with single rotor: with and without damping .Critical speed of a shaft carrying multiple discs (without damping), Secondary critical speed.

Unit – IV

Systems With Two Degrees of Freedom : Un-damped free vibration of 2 d.o.f and Principal modes of vibration; torsion vibrations; Forced, Un-damped vibrations with harmonic excitation ; Coordinate coupling; Dynamic vibration absorber; torsion Vibration Absorber; Pendulum type of dynamic vibration.

Unit-V

Noise Measurement & Control : Noise and its causes, sound pressure / intensity / power level and their inter-relation, Decibel scale, Loudness and equal loudness contours, Effect of machine / process noise on operators, employees and local residents. Standards of noise level and exposure limit, Methods of industrial noise control, Measurement of noise, Sound spectra and octave band analysis. Background noise, weighted networks,

Reference Books:

1. *"Mechanical Vibrations and Noise Engineering", by Ambekar A.G; Publisher: PHI*
2. *"Element of Vibration Analysis", by Meirovitch Leonard Publisher: TMH*
3. *"Text book of Mechanical Vibrations", by Dukkipati RV Srinivas J; Publisher PHI*
4. *"Mechanical Vibrations", by Kelly SG and kudari SK; Publisher: SchaumSeries;TMH*
5. *"Theory of Vibration with Applications", by Thomson, W.T publisher: C.B.S Pub & distributors*

List of Experiments

1. To find out effect of load on natural frequency of vibrations of a lever pin supported at one end carrying adjustable load on a vertical screwed bar and spring supported at some

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

B. Tech. in Mechanical Engineering

intermediate point (i) When the dead weight of rods is neglected and (ii) when their dead weight is taken into account

2. To find out frequency of damped free vibration and rate of decay of vibration-amplitude in the system
3. To find out natural frequency and damped free frequency of a torsion pendulum and, hence to find out coefficient of damping of the oil
4. To observe the phenomenon of ' whirl' in a horizontal light shaft and to determine the critical speed of the shaft
5. To observe the mode shapes of a spring-connected, double pendulum and hence to demonstrate the phenomenon of beats.
6. To demonstrate the principle of tuned Un-damped Dynamic Vibration Absorber and to determine the effect of mass-ratio (of main and auxiliary mass) on the spread of the resulting Natural frequencies
7. To take measurements of sound Pressure Level (SPL) and to carry out octave band analysis of a machine using Noise Level Meter

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Name of Program: B. Tech (Railway Engineering)

(Session 2018-19)

SUBJECT CODE	CATEGORY	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHERS ASSESSMENT	END SEM UNIVERSITY EXAM	TEACHERS ASSESSMENT				
BTEC606		Technical Communication and Soft Skills	0	0	0	0	50	1	0	0	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. Demonstrate knowledge of and familiarity with the nature of technical writing and the qualities of technical style;
2. Apply the principles of letter writing to various types of technical communications
3. Demonstrate a knowledge of writing various types of short reports;
4. Gather, analyze, and organize needed data for writing a formal research report;
5. Learn and apply basic concepts of soft skills.

Course Outcomes (COs):

The students will be able to

1. Design different technical documents.
2. Set goals for carrier planning.
3. Correlate them with Industrial environment.

Syllabus

Module I

Overview of Technical Research & Report Writing

1. Definition & Nature of Technical Writing
2. Properties of Technical Writing
3. Basic Principles of Technical Writing
4. Role of Technical Writing

Techniques in Technical Writing

(A)

1. Parts of a letter

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

2. Formats / Style of a letter

(B)

1. Report Layout
2. Format Report Format
3. Abstract
4. Proposal
5. Research Report

Module II

Soft skills: Individual Interaction and skills, Team Building, Dress for Success, Table Manners, Organizing Meetings, Stress Management, Telephone etiquettes, Time Management, Multi-Tasking, Presentation Skills, Organizational Skills, Group Discussion, Personal Interview, Public Speaking.

Reference Books:

1. Peggy Klaus, The Hard Truth about Soft Skills.
2. Nitin Bhatnagar, Effective Communication and Soft Skills. Pearson Education India.
3. Eric Garner. Team Building.
4. Wendy Palmer and Janet Crawford. Leadership Embodiment.
5. Technical Report writing. ECC Graphics, Quezon City
6. Vincente, C, et AL.(2004) Technical Writing. Popular Bookstore, Quezon City Philippines
7. Writing in English: A Practical Handbook for Scientific & Technical writers ©2000

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

Shri Vaishnav Vidyapeeth Vishvavidyalaya, Indore

Name of Program: B. Tech (Railway Engineering)

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BTRW611		Locomotives and Rail Road Transportation	60	20	20	-	-	3	1	-	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Objective:

This course enables to develop the basics operation of locomotives their classification. It also covers the topics on classification of locomotive and rail road transportation. This course is must for students who want to work in railway department.

Course Outcome:

After the successful completion of this course students will be able to:

1. Compare the Regenerative and Rheostat Braking of locomotives.
2. Explain the classification of locomotives.
3. Illustrate the effect of High-speed Track
4. Understand about the Rail Road transportation.

Syllabus

UNIT I **[6 Hours]**

Locomotives and Other Rolling Stock : Types of Traction, Nomenclature of Steam Locomotives, Classification of Locomotives, Preventive Maintenance of Locomotives, Rolling Stock, Brake Systems, Maintenance of Coaches and Wagons, Design Features of Modern Coaching and Goods Stock.

UNIT II **[10 Hours]**

Locomotive Classifications: Motive Power, Steam Locomotive Electric Locomotive, Diesel Locomotive, Slug and Drone Locomotive, Gasoline Locomotive, Hybrid Locomotives, Battery Locomotives, Diesel Locomotives of Indian railways: A Technical histories, Three Main Categories of Locomotives are often Subdivide in their use in the Rail Transport Operation, Passenger Locomotive, Fright Locomotive and Switcher Locomotive.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

UNIT III **[10 Hours]**

Electric Locomotive: Introduction, History, Definition, Non Electric and Electric Traction System, Main Parts of Electric Locomotive, Pantograph, Circuit Breaker, Transformer and Rectifier, Advantages and Disadvantages of the Electric Locomotive, Block Diagram, Types of Electric Locomotive, DC and AC Current Locomotive, Electric, Electric Transmission, Electric locomotive Comparison to Multiple Units.

UNIT IV **[8 Hours]**

Rail Road Transportation: Introduction to Rail Transportation, Road Transport, Advantage and Disadvantages of the Rail Transport, High Speed Rail, Types of Coaches, Common Goals & Function of Railroad Industry, Train, Definition, Passenger Train and Freight Train Types of Train, High Speed Rail, Maglev, Intercity Trains, Short Distance Train, Long Distance Trains.

UNIT V **[6 Hours]**

Modernization of Railways and High Speed Trains: Modernization of Railways, Effect of High-speed Track, Vehicle Performance on Track, High-speed Ground Transportation System, Ballastless Track.

Text Books:

1. Agarwal, A.K., Dhar, A., Pandey, A., "Locomotives and Rail Road Transportation" Springer, 1st Edition, 2017
2. Chandra, S., Agarwal, M.M., "Railway Engineering", Oxford University Press, 2nd Edition, 2013.

References Books:

1. Upadhyay, J. & Mahindra, S. N., "Electric Traction", Allied Publishers Pvt. Ltd., 1th Edition, 2000.
2. Bindra, S.P., "Element of Bridge Tunnel & Railway Engineering", Dhanpat Rai Publications, Delhi, Latest Edition, 2016.
3. Kutz, Myer "Hand Book of Transport Engineering" Second edition, McGraw-Hill, 2nd Edition, March, 2017.
4. Rangwala, C.N., "Railway Engineering", Charotar Publishing, 26th Edition, 2016.
5. Edward P. Burch, "Electric Traction for Railway Trains" McGraw-Hill Book Company,1911.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

B Tech in Railway Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTRW612		Mechanics of Composites	60	20	20	0	0	3	1	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
Q/A – Quiz/Assignment/Attendance, MST Mid Semester Test.

Course Educational Objectives (CEOs):

(A)Mechanics of composite materials provides a methodology for stress analysis and (B) progressive failure analysis of laminated composite structures for aerospace, automobile, marine and other engineering applications.

Course Outcomes (COs):

After the completion of the course, students will be able to demonstrate following knowledge, skills and attitudes

The student will be able to

1. An ability to identify the properties of fiber and matrix materials used in commercial composites, as well as some common manufacturing techniques.
2. An ability to predict the elastic properties of both long and short fiber composites based on the constituent properties.
3. An ability to rotate stress, strain and stiffness tensors using ideas from matrix algebra.
4. A basic understanding of linear elasticity with emphasis on the difference between isotropic and anisotropic material behavior.
5. An ability to analyze a laminated plate in bending, including finding laminate properties from lamina properties and find residual stresses from curing and moisture.
6. An ability to predict the failure strength of a laminated composite plate.
7. A knowledge of issues in fracture of composites and environmental degradation of composites.
8. An exposure to recent developments in composites, including metal and ceramic matrix composites.
9. An ability to use the ideas developed in the analysis of composites towards using composites in aerospace design.

Syllabus

Unit-I

Introduction to Composite Materials: Definition, Classification, Types of matrices material and reinforcements, Characteristics & selection, Fiber composites, laminated composites, Particulate composites, Prepegs, and sandwich construction.

Metal Matrix Composites: Reinforcement materials, Types, Characteristics and selection, Base metals, Selection, Applications harmonic excitation.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

B Tech in Railway Engineering

Unit-II

Macro Mechanics of a Lamina: Hooke's law for different types of materials, Number of elastic constants. Derivation of nine independent constants for orthotropic material, Two - dimensional relationship of compliance and stiffness matrix.Hooke's law for two-dimensional angle lamina, engineering constants - Numerical problems. Invariant properties. Stress-Strain relations for lamina of arbitrary orientation, Numerical problems.

Unit-III

Micro Mechanical Analysis of a Lamina: Introduction, Evaluation of the four elastic moduli, Rule of mixture, Numerical problems. Experimental Characterization of Lamina- Elastic Moduli and Strengths
Failure Criteria: Failure criteria for an elementary composite layer or Ply, Maximum Stress and Strain Criteria, Approximate strength criteria, Inter-laminar Strength, Tsa-Hill theory, Tsai, Wu tensor theory, Numerical problem, practical recommendations.

Unit-IV

Macro Mechanical Analysis of Laminate: Introduction, code, Kirchhoff hypothesis, Classical Lamination Theory, A, B, and D matrices (Detailed derivation), Special cases of laminates, Numerical problems. Shear Deformation Theory, A, B, D and E matrices (Detailed derivation)
Analysis of Composite Structures: Optimization of Laminates, composite laminates of uniform strength, application of optimal composite structures, composite pressure vessels, spinning composite disks, composite lattice structures.

Unit-V

Manufacturing and Testing: Layup and curing - open and closed mould processing, Hand lay-up techniques, Bag moulding and filament winding. Pultrusion, Pulforming, Thermoforming, Injection moulding, Cutting, Machining, joining and repair. NDT tests – Purpose, Types of defects, NDT method - Ultrasonic inspection, Radiography, Acoustic emission and Acoustic ultrasonic method.
Applications: Aircrafts, missiles, Space hardware, automobile, Electrical and Electronics, Marine, Recreational and sports equipment-future potential of composites.

References

1. *Autar K. Kaw, Mechanics of Composite materials, CRC Press, 2nd Ed. 2005.*
2. *MadhijitMukhopadhay, Mechanics of Composite Materials & Structures, Universities Press, 2004.*
3. *J. N. Reddy, Mechanics of Laminated Composite Plates & Shells, CRD Press, 2nd Ed. 2004.*
4. *Mein Schwartz, Composite Materials handbook, McGraw Hill, 1984.*
5. *Rober M. Jones, Mechanics of Composite Materials, Taylor & Francis, 1998.*
6. *Michael W. Hyer, Stress analysis of fiber Reinforced Composite Materials, Mc-Graw Hill International, 2009.*
7. *Composite Material Science and Engineering, Krishan K. Chawla, Springer, 3e, 2012.*
8. *Fibre Reinforced Composites, P.C. Mallik, Marcel Decker, 1993.*

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

Shri Vaishnav Vidhyapeeth Vishvavidhyalaya, Indore

Name of Program: B. Tech. (Railway Engineering)

Subject Code	Category	Subject Name	Teaching &Evaluation Scheme								
			Theory			Practical		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BTEE613		Energy Auditing	60	20	20	-	20	3	1		4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Educational Objectives (CEOs):
To prepare the students to have a basic and practical knowledge of Energy Audit. To prepare the students to have a basic knowledge of pre Audit and post Audit.

Course Outcomes (COs): Upon completion of this course students will be able to:

1. Demonstrate various types of energy audit.
2. Conduct Different Strategies of energy audit.
3. Understand and analyze Energy Audit Instruments Combustion Analysis.
4. Methodologies of Conducting Energy Audit Preliminary Questionnaire.

UNIT I

Energy Audit **[8 Hrs]**

Definition, Need and Objectives.

Types of Energy Audit

Internal Audit, External Audit, Walk through Energy Audit, Preliminary Energy Audit, Detailed Energy Audit, Investment Grade Energy Audit, Industrial Energy Audit, Utility (Services) Energy Audit, Commercial Energy Audit, Residential Energy Audit.

UNIT II **[8 Hrs]**

Energy Audit Strategies Monitoring and Control, Questioning the Need, Minimizing the Need of End Use, Minimizing the Losses, Operating the Equipment at Optimum Efficiency, Operating the Most Efficient Equipments from Set of Equipments, Minimizing the Idle Redundant Running, Proper Maintenance of the Equipment, Substitution with Efficient Equipment, Substitution with more Efficient Equipment, Substitution with more Efficient Process, Energy Storage, Fuel Substitutions, Quality Control and Recycling. Basic Components of Energy Audit

Preparing for Audit Visit, Instrumentation, Data Collection Techno-economic Analysis, Safety Considerations.

UNIT III **[7 Hrs]**

Energy Audit Instruments Combustion Analysis, Temperature Management, Pressure Measurement, Flow Measurement, Humidity Measurement, Energy and Power Measurement, Light Level Measurement, Infrared Equipment, Tachometer & Stroboscope, P.F. Meter, Ultrasonic flow meter, and Steam & Air Leak Detector.

UNIT IV **[8 Hrs]**

Important Survey Items Buildings, Lightings, HVAC, Furnaces & Ovens, Boilers and Steam Lines, Air Compressor and Compressed Air Distribution Lines, Chillers and Chilled Water Distribution Lines, Process Water Generation and Distribution Lines, Electrical Distributions Transformers and Lines, Pumps, Fans and Blowers, Cooling Towers, Electrical Motors, Waste Heat Sources, Material Transport, Peak Load Equipments.

UNIT V **[8 Hrs]**

Methodologies of Conducting Energy Audit Preliminary Questionnaire, Review of Previous Records, Introductory Meeting, Walk through Tour, Flow Chart Construction for Detail Energy Audit, Identification of Required Audit Instruments, Finalization of Audit Schedule with the Company, Getting Detailed Data.

Post Audit Analysis Process Flow Diagram, Material and Energy Balance. Audit Subsidy Scheme of PCRA, IDBI and IREDA.

Text Books

1. Albert Thumann, P.E., C.E.M. , Plant engineers & Managers Guide To Energy Conservation 8 th edition-2002, Published By The Fairmont Press , Inc 700 Indian Trail Liburn, GA30047.
2. BEE Volume I –Second Edition 2005 5. G.G. Ranjan: Optimizing Energy Efficiencies in Industry ,Edition-2003 McGraw Hill

Reference Books

1. Instructions to Energy Auditors, Vol. - I & Vol. - II – National Technical Information Services U. S. Deptt. Of Commerce Springfield, VA 22161.
2. Energy Auditing, The Fairmont Press Inc. Published by Atlanta, Georgia Commercial Energy Auditing Reference Handbook, Third Edition 2016, Steve Dorty.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Name of Program: B. Tech (Railway Engineering)

SUBJECT CODE	CATEGORY	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHERS ASSESSMENT	END SEM UNIVERSITY EXAM	TEACHERS ASSESSMENT	Th.	T	P	CREDITS
BTEE614		System Engineering	60	20	20	0	0	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVE

The aim of the course is to equip students with capability to develop system solutions that optimally fulfill customer objectives with available resources. Focus will be on creating know-how on solving open-ended problems, utilizing creativity, problem formulation, generation of need statements, requirements analysis, and alternative solutions generation.

COURSE OUTCOME

After successful completion of the course, students would be able to

1. Plan and manage the systems engineering process.
2. Examine systems from many perspectives (such as software, hardware, product, etc.).
3. Distinguish critical functions, diagnose problems.
4. Judge the complexity of production and deployment issues.

UNIT I **[9 Hrs]**

What is System Engineering, Origin, Examples of Systems requiring systems engineering, power of systems engineering, Systems Engineer Career Development Model, Systems Engineering viewpoint, perspectives, domains, approaches, activities, and products.

UNIT II **[7 Hrs]**

Complex system structure-building blocks, hierarchy, interfaces, Complex system structure-environment, interactions, complexity in Modern Systems.

UNIT III **[9 Hrs]**

System development process – life cycle, evolutionary characteristics, Originating a New System, Operations Analysis, Functional Analysis, Feasibility, System Operational Requirements, Implementation of Concept Exploration.

UNIT IV **[8 Hrs]**

Engineering development stage – program risk reduction, prototype development for risk mitigation, Development testing, risk reduction, Revision of functional analysis and design.

UNIT V **[9 Hrs]**

Integration and Evaluation, Integrating, Testing, and Evaluating the Total System, Test Planning and Preparation, System Integration, Developmental System Testing, Operational Test And Evaluation, Engineering for Production, Transition from Development to Production, Production Operations.

TEXT BOOKS:

1. Kossiakoff, A. Sweet, William N, System Engineering Principles and Practice, Wiley India, 2016
2. Blanchard, Benjamin S. Fabrycky, Wolter J. Systems engineering and analysis, Pearson,2013.

REFERENCE BOOKS:

1. Whitten, Jeffrey L. Bentley, Lonnie D. System Analysis and Design Methods, McGraw-Hill Higher Education, 2006.
2. Buede, Dennis M. Miller, William D. The Engineering Design of Systems: Models & Methods. Wiley India, 2016.
3. 3 Stevens, Richard. Brook, Peter. System Engineering – Coping with complexity. Prentice Hall, 1998.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)