VEL TECH MULTI TECH

Dr.RANGARAJAN Dr.SAKUNTHALA ENGINEERING COLLEGE

(An ISO 9001: 2000 Certified Institution)
(Owned by 'VEL Shree R. Rangarajan
Dr. Sakunthala Rangarajan Educational Academy)

(Approved by AICTE, New Delhi
&
Govt. of Tamil Nadu and affiliated to Anna University)

SYLLABUS
WEEKLY SCHEDULE
VI SEMESTER
2013-2014
4 Year Degree Course in Engineering

MECHANICAL ENGINEERING

42, Avadi – Alamathi Road,
Chennai – 600062
Telefax – 044-26841061
E-mail: veltech@md3.vsnl.net.in
Website : www.vel-tech.org

VI SEMESTER CONTENTS

S. N	SUB CODE	SUBJECT
1	MG 2351	Principles of Management
2	ME 2351	Gas Dynamics & Jet Propulsion
3	ME 2352	Design of Transmission Systems
4	ME 2354	Automobile Engineering
5	ME 2353	Finite Element Analysis
6	ME 2026	Unconventional Manufacturing Processes

WEEK DETAILS YEAR 2013-2014

S.NO	WEEKS	DATE	
		FROM	TO
1.	WEEK 1	02.01.14	10.01.14
2.	WEEK 2	16.01.14	24.01.14
3.	WEEK 3	27.01.14	04.02.14
4.	WEEK 4	05.02.14	13.02.14
5.	WEEK 5	14.02.14	24.02.14
6.	WEEK 6	25.02.14	05.03.14
7.	WEEK 7	06.03.14	14.03.14
8.	WEEK 8	17.03.14	25.03.14
9.	WEEK 9	26.03.14	04.04.14
10.	WEEK 10	05.04.14	12.04.14
11.	WEEK 11	15.04.14	25.04.14

MG 2351 PRINCIPLES OF MANAGEMENT

WEEK: 1 - OVERVIEW OF MANAGEMENT (UNIT 1)

Definition - Management - Role of managers

Evolution of Management thought - Organization and the environmental factors

WEEK: 2

Trends and Challenges of Management in Global Scenario

WEEK: 3 – PLANNING (UNIT 2)

Nature and purpose of planning - Planning process - Types of plans – Objectives - Managing by objective (MBO) Strategies

WEEK: 4

Types of strategies - Policies – Decision Making - Types of decision

Decision Making Process - Rational Decision Making Process - Decision making under different conditions

WEEK: 5 – CYCLE TEST-1 (Unit I & II)

WEEK: 6 – ORGANIZING (UNIT 3)

Nature and purpose of organizing - Organization structure – Formal and informal groups / Organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization

WEEK: 7

Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - Performance Appraisal

WEEK: 8 - DIRECTING (UNIT 4)

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories

Communication - Barriers to effective communication - Organization Culture - Elements and types of culture – Managing cultural diversity

WEEK: 9 – CYCLE TEST II (Unit III & IV)

WEEK: 10 - CONTROLLING (UNIT 5)

Process of controlling - Types of control - Budgetary and non -budgetary control techniques - Managing Productivity - Cost Control.

Purchase Control – Maintenance Control - Quality Control - Planning operations

WEEK: 11 (MODEL EXAM)

ME 2351 GAS DYNAMICS AND JET PROPULSION

WEEK: 1 - BASIC CONCEPTS AND ISENTROPIC FLOWS (UNIT 1)

Energy and momentum equations of compressible fluid flows – Stagnation states

Mach waves and Mach cone – Effect of Mach number on compressibility

WEEK: 2

Isentropic flow through variable ducts – Nozzle and Diffusers – Use of Gas tables

WEEK: 3 FLOW THROUGH DUCTS (UNIT 2)

Flows through constant area ducts with heat transfer (Rayleigh flow) and Friction (Fanno flow)

WEEK: 4

Variation of flow properties – Use of tables and charts
Generalised gas dynamics

WEEK: 5 – CYCLE TEST-I (Unit I & II)

WEEK: 6 – NORMAL AND OBLIQUE SHOCKS (UNIT 3)

Governing equations – Variation of flow parameters across the normal and oblique shocks

WEEK: 7

Prandtl – Meyer relations – Use of table and charts – Applications

JET PROPULSION (UNIT 4)

Theory of jet propulsion – Thrus t equation – Thrust power and propulsive efficiency – Operation principle

WEEK: 8

Cycle analysis and use of stagnation state performance of ram jet, turbojet, turbofan and turbo prop engines

WEEK: 9– CYCLE TEST II (Unit III & IV)

WEEK: 10 - SPACE PROPULSION (UNIT 5)

Types of rocket engines – Propellants-feeding systems – Ignition and combustion – Theory of rocket propulsion – Performance study – Staging. Terminal and characteristic velocity – Applications – space flights

WEEK: 11 (MODEL EXAM)

ME 2352 **DESIGN OF TRANSMISSION SYSTEMS**

WEEK: 1- DESIGN OF TRANSMISSION SYSTEMS FOR FLEXIBLE ELEMENTS (UNIT 1)

Selection of V belts and pulleys-selection of Flat belts and pulleys

Wire ropes and pulleys – Selection of Transmission chains and Sprockets

WEEK: 2

Design of pulleys and sprockets

SPUR GEARS AND PARALLEL AXIS HELICAL GEARS (UNIT 2)

Gear Terminology-Speed ratios and number of teeth-Force analysis -Tooth stresses - Dynamic effects - Fatigue strength - Factor of safety

WEEK: 3

Gear materials – Module and Face width-power rating calculations based on strength and wear considerations - Parallel axis Helical Gears

WEEK: 4

Pressure angle in the normal and transverse plan - Equivalent number of teeth-forces and stresses, estimating the size of the helical gears

WEEK: 5 – CYCLE TEST-I (Unit I & II)

WEEK: 6 – BEVEL, WORM AND CROSS HELICAL GEARS (UNIT 3)

Straight bevel gear: Tooth terminology, tooth forces and stresses, equivalent number of teeth, estimating the dimensions of pair of straight bevel gears.

Worm Gear: Merits and demerits- terminology. Thermal capacity, materials-forces and stresses, efficiency, estimating the size of the worm gear pair.

WEEK: 7

Cross helical: Terminology-helix angles-Estimating the size of the pair of cross helical gears.

WEEK: 8 - DESIGN OF GEAR BOXES (UNIT 4)

Geometric progression - Standard step ratio - Ray diagram, kinematics layout

Design of sliding mesh gear box -Constant mesh gear box – Design of multi speed gear box

WEEK: 9 – CYCLE TEST II (Unit III & IV)

WEEK: 10- DESIGN OF CAM CLUTCHES AND BRAKES (UNIT 5)

Cam Design: Types-pressure angle and under cutting base circle determination-forces and surface stresses.

Design of plate clutches –axial clutches-cone clutches-internal expanding rim clutches internal and external shoe brakes.

WEEK: 11 (MODEL EXAM)

ME 2353 FINITE ELEMENT ANALYSIS

WEEK: 1- FINITE ELEMENT FORMULATION OF BOUNDARY VALUE PROBLEMS (UNIT 1)

Weighted residual methods – general weighted residual statement –weak formulation of the weighted residual statement – comparisons

Piecewise continuous trial functions example of a bar finite element –functional and differential forms – principle of stationary total potential

WEEK: 2

Rayleigh Ritz method – piecewise continuous trial functions – finite Element method – application to bar element

ONE DIMENSIONAL FINITE ELEMENT ANALYSIS (UNIT 2)

General form of total potential for 1-D applications – generic form of finite element equations – linear bar element – quadratic element –nodal approximation – development of shape functions

WEEK: 3

Element matrices and vectors – example problems – extension to Plane truss– development of element equations – assembly – element connectivity – global equations

WEEK: 4

Solution methods –beam element – nodal approximation – shape functions – element matrices and vectors – assembly – solution – example problems

WEEK: 5 – CYCLE TEST-I (Unit I & II)

WEEK: 6 TWO DIMENSIONAL FINITE ELEMENT ANALYSIS (UNIT 3)

Introduction – approximation of geometry and field variable – 3noded triangular elements – four noded rectangular elements – higher order elements – generalized coordinates approach to nodal approximations – difficulties – natural coordinates and coordinate transformations – triangular and quadrilateral elements – ISO-parametric elements – structural mechanics applications in 2-dimensions

WEEK: 7

elasticity equations – stress strain relations – plane problems of elasticity – element equations – assembly – need for quadrature formule – transformations to natural coordinates – Gaussian quadrature – example problems in plane stress, plane strain and axisymmetric applications

WEEK: 7 - DYNAMIC ANALYSIS USING FINITE ELEMENT METHOD (UNIT 4)

Introduction – Vibration problems – equations of motion based on weak form – longitudinal vibration of bars – transverse vibration of beams – consistent mass matrices – element equations – solution of Eigen value problems

Vector iteration methods – normal modes – transient vibrations – modelling of damping – mode superposition technique – direct integration methods

WEEK: 9 – CYCLE TEST II (Unit III & IV)

WEEK: 10 - APPLICATIONS IN HEAT TRANSFER & FLUID MECHANICS (UNIT 5)

One dimensional heat transfer element – application to one-dimensional heat transfer problems-scalar variable problems in 2-Dimensions – Applications to heat transfer in 2

Dimension – Application to problems in fluid mechanics in 2-D

WEEK: 11 (MODEL EXAM)

ME 2354 AUTOMOBILE ENGINEERING

WEEK: 1- VEHICLE STRUCTURE AND ENGINES (UNIT 1)

Types of Automobiles, vehicle construction and different layouts

Chassis, frame and body, resistances to vehicle motion and need for a gearbox

WEEK: 2

Components of engine-their forms,functions and materials

ENGINE AUXILIARY SYSTEMS (UNIT 2)

Electronically controlled gasoline injection system for SI engines, electronically controlled diesel injection system

WEEK: 3

Injector system, Rotary distributor type and common rail direct injection system

WEEK: 4

Electronic ignition system, turbo chargers, Engine Emission control by three way catalytic converter system

WEEK: 5 – CYCLE TEST-I (Unit I & II)

WEEK: 6 – TRANSMISSION SYSYTEMS (UNIT 3)

Clutch-types and construction gear boxes- manual and automatic, gear shift mechanisms

WEEK: 7

Over drive, transfer box, fluid flywheel –torque converter , propeller shaft, slip joints, universal joints ,Differential, and rear axle, Hotchkiss Drive and Torque Tube Drive.

WEEK: 8- STEERING, BRAKES AND SUSPENSION SYSTEMS (UNIT 4)

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, types of Suspension Systems.

Pneumatic and hydraulic braking systems, Antilock braking system and traction control.

WEEK: 9 – CYCLE TEST II (Unit III & IV)

WEEK: 10 - ALTERNATIVE ENERGY SOURCES (UNIT 5)

Use of natural gas, Liquefied petroleum gas. Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance

Combustion and Emission Characteristics of SI and CI engines with these alternate fuels – Electric and Hybrid Vehicles, Fuel Cell

WEEK: 11 (MODEL EXAM)

ME 2606 UNCONVENTIONAL MANUFACTURING PROCESSES

WEEK: 1- INTRODUCTION (UNIT 1)

Unconventional machining Process – Need

Classification – Brief overview of all techniques.

WEEK: 2 - MECHANICAL ENERGY BASED PROCESSES (UNIT 2)

Abrasive Jet Machining – Water Jet Machining –working principle, equipment used

WEEK: 3

Abrasive water jet machining, Ultrasonic Machining–working principle, equipment used

USM, AJM, WJM, AWJM– surface finish and Process parameters

WEEK: 4

USM, AJM, WJM, AWJM – MRR-Variation in techniques used – Applications

WEEK: 5 – CYCLE TEST-I (Unit I & II)

WEEK: 6– ELECTRICAL ENERGY BASED PROCESSES (UNIT 3)

Electric Discharge Machining (EDM)- working Principles-equipments-Process Parameters

MRR- electrode / Tool – Power Circuits-Tool Wear – Dielectric – Flushing – Wire cut EDM - surface finish – Applications

WEEK: 7 - CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES (UNIT 4)

Chemical machining and Electro-Chemical machining (CHM and ECM) Etchants-maskant-techniques of applying maskants

WEEK: 8

Process Parameters -surface finish -– MRR-Applications Principles of ECM-equipments-MRR-Electrical circuit-Surface roughness-Process Parameters-ECG and ECH Applications

WEEK: 9 – CYCLE TEST II (Unit III & IV)

WEEK: 10 - THERMAL ENERGY BASED PROCESSES (UNIT 5)

Laser Beam machining (LBM), plasma Arc machining (PAM) Principles-Equipment-Types - Beam control techniques- Laser Drilling- Surface finish

Electron Beam Machining (EBM). Principles-Equipment-Types-Beam control techniques-Surface finish – Applications

WEEK: 11 (MODEL EXAM)