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
IV SEMESTER
2013-2014
4 Year Degree Course in Engineering

MECHANICAL ENGINEERING

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IV SEMESTER CONTENTS

S. N	SUB CODE	SUBJECT
1	MA 2266	Statistics and Numerical Methods
2	ME 2251	Heat and Mass Transfer
3	ME 2252	Manufacturing Technology – II
4	ME 2253	Engineering Materials & Metallurgy
5	ME 2254	Strength of Materials
6	ME 2255	Electronics and Microprocessor

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

MA 2266 STATISTICS AND NUMERICAL METHODS

WEEK: 1 - TESTING OF HYPOTHESIS (UNIT 1)

Sampling distributions - Tests for single mean, Proportion, Difference of means (large and small samples)

WEEK: 2

Tests for single variance and equality of variances

WEEK: 3

Chi-square test for goodness of fit – Independence of attributes

DESIGN OF EXPERIMENTS (UNIT 2)

Completely randomized design

WEEK: 4

Randomized block design

Latin square design - 2_2 -factorial design

WEEK: 5 – CYCLE TEST-1 (Unit I & II)

WEEK: 6 – SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS (UNIT 3)

Newton-Raphson method- Gauss Elimination method – Pivoting - Gauss-Jordan methods – Iterative methods of Gauss

Jacobi and Gauss-Seidel - Matrix Inversion by Gauss-Jordan method - Eigen values of a matrix by Power method

WEEK: 7 - INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION (UNIT 4)

Lagrange's and Newton's divided difference interpolation –Newton's forward and backward difference interpolation

WEEK: 8

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal and Simpson's 1/3 rules

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

WEEK: 10 - NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (UNIT 5)

Taylor's series method - Euler's method - Modified Euler's method - Fourth order Range - Kutta method for solving first and second order equations - Milne's predictor

Corrector methods for solving first order equations - Finite difference methods for solving second order equation

WEEK: 11 (MODEL EXAM)

MA 2251 HEAT & MASS TRANSFER

WEEK: 1 - CONDUCTION (UNIT 1)

Basic Concepts – Mechanism of Heat Transfer – Conduction, Convection and Radiation – Fourier Law of Conduction - General Differential equation of Heat Conduction –– Cartesian and Cylindrical Coordinates

WEEK: 2

One Dimensional Steady State Heat Conduction – Conduction through Plane Wall, Cylinders and Spherical systems – Composite Systems

Conduction with Internal Heat Generation – Extended Surfaces –
Unsteady Heat Conduction – Lumped Analysis – Use of Heislers Chart

WEEK: 3 – CONVECTION (UNIT 2)

Basic Concepts –Heat Transfer Coefficients – Boundary Layer Concept – Types of Convection – Forced Convection – Dimensional Analysis – External Flow – Flow over Plates, Cylinders and Spheres

WEEK: 4

Internal Flow – Laminar and Turbulent Flow – Combined Laminar and Turbulent – Flow over Bank of tubes – Free Convection

Dimensional Analysis – Flow over Vertical Plate, Horizontal Plate, Inclined Plate, Cylinders and Spheres

WEEK: 5 – CYCLE TEST-1 (Unit I & II)

WEEK: 6 – PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS (UNIT 3)

Nusselts theory of condensation-pool boiling, flow boiling, correlations in boiling and condensation, Types of Heat Exchangers

Heat Exchanger Analysis – LMTD Method and NTU - Effectiveness – Overall Heat Transfer Coefficient – Fouling Factors

WEEK: 7 - RADIATION (UNIT 4)

Basic Concepts, Laws of Radiation – Stefan Boltzman Law, Kirchhoff's Law –Black Body Radiation – Grey body radiation

WEEK: 8

Shape Factor Algebra – Electrical Analogy – Radiation Shields –Introduction to Gas Radiation

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

WEEK: 10 - MASS TRANSFER (UNIT 5)

Basic Concepts – Diffusion Mass Transfer – Flick's Law of Diffusion – Steady state Molecular Diffusion – Convective Mass Transfer - Momentum

Heat and Mass Transfer Analogy – Convective Mass Transfer Correlations

WEEK: 11 (MODEL EXAM)

MA 2252 MANUFACTURING TECHNOLOGY - II

WEEK: 1 - THEORY OF METAL CUTTING (UNIT 1)

Introduction: material removal processes, types of machine tools

Theory of metal cutting: chip formation, orthogonal cutting, cutting tool materials

WEEK: 2

Tool wear, tool life, surface finish, cutting fluids

CENTRE LATHE AND SPECIAL PURPOSE LATHES (UNIT 2)

Centre lathe, constructional features, cutting tool geometry, various operations, taper turning methods, thread cutting methods, special attachments

WEEK: 3

Machining time and power estimation, Capstan and turret lathes – automats

WEEK: 4

Single spindle, Swiss type, automatic screw type, multi spindle - Turret Indexing mechanism, bar feed mechanism

WEEK: 5 – CYCLE TEST-1 (Unit I & II)

WEEK: 6 – OTHER MACHINE TOOLS (UNIT 3)

Reciprocating machine tools: shaper, planer, slotter - Milling: types, milling cutters, operations - Hole making: drilling - Quill mechanism , Reaming, Boring, Tapping

WEEK: 7

Sawing machine: hack saw, band saw, circular saw; broaching machines: broach construction – push, pull surface and continuous broaching machines

WEEK: 8- ABRASIVE PROCESSES AND GEAR CUTTING (UNIT 4)

Abrasive processes: grinding wheel – specifications and selection, types of grinding process – cylindrical grinding, surface grinding, centre less grinding.

Honing, lapping, super finishing, polishing and buffing, abrasive jet machining - Gear cutting, forming, generation, shaping, hobbing

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

WEEK: 10 - CNC MACHINE TOOLS AND PART PROGRAMMING (UNIT 5)

Numerical control (NC) machine tools – CNC: types, constructional details, special features – design considerations of CNC machines for improving machining accuracy – structural members – slide ways –linear bearings – ball screws. Spindle drives and feed drives. Part programming fundamentals – manual programming – computer assisted part programming

WEEK: 11 (MODEL EXAM)

MA 2253 ENGINEERING MATERIALS & METALLURGY

WEEK: 1 - CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS (UNIT 1)

Constitution of alloys – Solid solutions, substitutional and interstitial

Phase diagrams, Isomorphism, eutectoid, eutectic, paratactic, and peritectroid reactions

WEEK: 2

Iron – Iron carbide equilibrium diagram. Classification of steel and cast Iron, microstructure, properties and applications

WEEK: 3– HEAT TREATMENT (UNIT 2)

Definition – Full annealing, stress relief, recrystallisation and spheroidizing –normalising, hardening and tempering of steel, Isothermal transformation diagrams

WEEK: 4

Cooling curves superimposed on I.T. diagram, CCR - Hardenability, Jominy end quench test – Austempering

Martempering – case hardening - carburising, nitriding, cyaniding, carbonitriding, flame and induction hardening

WEEK: 5 – CYCLE TEST-1 (UNIT I & II)

WEEK: 6 – MECHANICAL PROPERTIES AND TESTING (UNIT 3)

Mechanism of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads

Hardness tests (Brinell, Vickers and Rockwell), Impact test - Izod and Charpy, Fatigue and creep tests, fracture toughness tests

WEEK: 7 - FERROUS AND NON FERROUS METALS (UNIT 4)

Effect of alloying elements on steel (Mn, Si, Cr, Mo, V, Ti & W) - stainless and tool steels – HSLA - maraging steels – Cast Irons - Grey, White malleable, spheroidal – Graphite, Alloy cast irons

WEEK: 8

Copper and Copper alloys - Brass, Bronze and Cupronickel – Aluminium and Al-Cu alloy – precipitation hardening– Bearing alloys

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

WEEK: 10 - NON-METALLIC MATERIALS (UNIT 5)

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE Polymers

Urea and Phenol Formaldehydes – Engineering Ceramics – Introduction to Fibre reinforced plastics

WEEK: 11 (MODEL EXAM)

MA 2254 STRENGTH OF MATERIALS

WEEK: 1 - STRESS STRAIN DEFORMATION OF SOLIDS (UNIT 1)

Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear

Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants

WEEK: 2

Strain energy and unit strain energy – Strain energy in uniaxial loads

BEAMS - LOADS AND STRESSES (UNIT 2)

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams

WEEK: 3

Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section

WEEK: 4

Effect of shape of beam section on stress induced – Shear stresses in beams – Shear flow

WEEK: 5 – CYCLE TEST-1 (UNIT I & II)

WEEK:6 – TORSION (UNIT 3)

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs

WEEK:7

Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs – stresses in helical coil springs under torsion loads

WEEK: 8 - BEAMDEFLECTION (UNIT 4)

Elastic curve of Neutral axis of the beam under normal loads – Evaluation of beam deflection and slope: Double integration method, Macaulay Method, and Moment

Area Method –Columns – End conditions – Equivalent length of a column – Euler equation – Slenderness ratio – Rankin formula for columns

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

WEEK: 10 - ANALYSIS OF STRESSES IN TWO DIMENSIONS (UNIT 5)

Biaxial state of stresses – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells – Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses

Mohr's circle for biaxial stresses – Maximum shear stress - Strain energy in bending and torsion

WEEK: 11(MODEL EXAM)

MA 2255 ELECTRONICS AND MICROPROCESSORS

WEEK: 1 - SEMICONDUCTORS AND RECTIFIERS (UNIT 1)

Classification of solids based on energy band theory-Intrinsic semiconductors
Extrinsic semiconductors-P type and N type-PN junction-Zenor effect

WEEK: 2

Zenor diode characteristics- Half wave and full wave rectifiers -Voltage regulation

WEEK: 3 – TRANSISTORS AND AMPLIFIERS (UNIT 2)

Bipolar junction transistor- CB, CE, CC configuration and characteristics-Biasing circuits- Class A, B and C amplifiers- Field effect transistor

WEEK: 4

Configuration and characteristic of FET amplifier-SCR, Diac, Triac, UJT-Characteristics and simple applications-Switching transistors

Concept of feedback-Negative feedback-Application in temperature and motor speed control

WEEK: 5 – CYCLE TEST-1 (UNIT I & II)

WEEK: 6 – DIGITAL ELECTRONICS (UNIT 3)

Binary number system - AND, OR, NOT, NAND, NOR circuits-Boolean algebra- Exclusive OR gate

WEEK: 7

Flip flops-Half and full adders-Registers-Counters-A/D and D/A conversion

8085 MICROPROCESSORS (UNIT 4)

Block diagram of microcomputer-Architecture of 8085-Pin configuration

WEEK: 8

Instruction set- Addressing modes-Simple programs using arithmetic and logical operations

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

WEEK: 10 - INTERFACING AND APPLICATIONS OF MICROPROCESSOR (UNIT 5)

Basic interfacing concepts - Interfacing of Input and Output devices-Applications of microprocessor Temperature control

Stepper motor control, traffic light control

WEEK: 11(MODEL EXAM)