



VEL TECH MULTI TECH
Dr.RANGARAJAN Dr.SAKUNTHALA ENGINEERING COLLEGE



(An ISO 9001: 2008 Certified Institution)
(Owned by 'VEL Shree R. Rangarajan
Dr. Sakunthala Rangarajan Educacional Academy)

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



SYLLABUS WEEKLY SCHEDULE

**V SEMESTER
2013 - 2014**

4 Year Degree Course in Engineering

MECH

42, Avadi – Alamathi Road,
Chennai – 600062
Telefax – 044-26841061

E-mail: veltech@md3.vsnl.net.in

Website : www.vel-tech.org



V SEMESTER CONTENTS

Sl.no	SUBJECT CODE	SUBJECT NAME
01	GE2021	Environmental Science & Engineering
02	ME2301	Thermal Engineering
03	ME2302	Dynamics of Machinery
04	ME2303	Design of Machine Elements
05	ME2304	Engineering Metrology & Measurements
06	ME2305	Applied Hydraulics & Pneumatics

WEEK DETAILS

YEAR 2013-2014

S.NO	WEEKS	DATE	
		FROM	TO
1.	WEEK 1	24.06.2013	28.06.2013
2.	WEEK 2	01.07.2013	05.07.2013
3.	WEEK 3	08.07.2013	12.07.2013
4.	WEEK 4	15.07.2013	19.07.2013
5.	WEEK 5	22.07.2013	26.07.2013
6.	WEEK 6	30.07.2013	02.08.2013
7.	WEEK 7	05.08.2013	08.08.2013
8.	WEEK 8	12.08.2013	16.08.2013
9.	WEEK 9	12.08.2013	16.08.2013
10.	WEEK 10	19.08.2013	23.08.2013
11.	WEEK 11	26.08.2013	30.08.2013
12.	WEEK 12	02.09.2013	06.09.2013
13.	WEEK 13	09.09.2013	13.09.2013
14.	WEEK 14	16.09.2013	21.09.2013
15.	WEEK 15	23.09.2013	28.09.2013
16.	WEEK 16	30.09.2013	06.10.2013

WEEK 1

Introduction To Environmental Studies And Natural Resources

Definition, scope and importance – need for public awareness – forest resources: use and over-exploitation, deforestation, case studies

WEEK2

Timber extraction, mining, dams and their ground water, floods, drought, conflicts over water, dams-benefits and problems mineral resources: use effects on forests and tribal people – water resources: use and over-utilization of surface and exploitation, environmental effects of extracting and using mineral resources, case studies – food resources: world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies

WEEK 3

Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies – land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain

WEEK 4

Ecosystems And 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 (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – introduction to biodiversity – definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – biodiversity at global, national and local levels

WEEK 5

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. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

WEEK 6

Environmental Pollution

Definition – causes, effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear hazards

WEEK 7 CYCLE TEST I

WEEK 8

Solid waste management: causes, effects and control measures of urban and industrial wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – urban / rural / industrial / agricultural

WEEK 9

Social Issues and the Environment

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, and watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies

WEEK 10

Environmental ethics: issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – consumerism and waste products –

WEEK 11

Environment protection act – air (prevention and control of pollution) act – water (prevention and control of pollution) act – wildlife protection act – forest conservation act – issues involved in enforcement of environmental legislation – public awareness

WEEK 9

Fixed and adjustable, electrical control solenoid valves, Relays, ladder diagram - Accumulators and Intensifiers

WEEK 10

Types of accumulators – Accumulators circuits, sizing of accumulators, intensifier – Applications of Intensifier – Intensifier circuit

WEEK 11

Pneumatic Systems And Components

Pneumatic Components: Properties of air – Compressors – Filter, Regulator, and Lubricator Unit – Air control valves, Quick exhaust valves, and pneumatic actuators

WEEK 12

Fluid Power Circuit Design, Speed control circuits, synchronizing circuit, Penumo hydraulic circuit, Sequential circuit design for simple applications using cascade method.

WEEK 13 - CYCLE TEST II

WEEK 14

Design of Pneumatic Circuits

Servo systems – Hydro Mechanical servo systems, Electro hydraulic servo systems and proportional valves - Fluidics – Introduction to fluidic devices

WEEK 15

Simple circuits, Introduction to Electro Hydraulic Pneumatic logic circuits ladder diagrams, PLC applications in fluid power control

WEEK-16

Fluid power circuits; failure and troubleshooting

WEEK 1**Fluid Power Systems And Fundamentals**

Introduction to fluid power, Advantages of fluid power, Application of fluid power system

WEEK 2

Types of fluid power systems, Properties of hydraulic fluids – General types of fluids – Fluid power symbols

WEEK 3

Basics of Hydraulics-Applications of Pascal's Law- Laminar and Turbulent flow – Reynolds's number – Darcy's equation – Losses in pipe, valves and fittings

WEEK 4

Hydraulic System & Components Sources of Hydraulic Power: Pumping theory – Pump classification – Gear pump, Vane Pump, piston pump

WEEK 5

Construction and working of pumps – pump performance – Variable displacement pumps

WEEK 6

Fluid Power Actuators: Linear hydraulic actuators – Types of hydraulic cylinders – Single acting, Double acting special cylinders like tandem, Rodless, Telescopic, Cushioning mechanism, Construction of double acting cylinder, Rotary actuators – Fluid motors, Gear, Vane and Piston motors

WEEK 7 CYCLE TEST I**WEEK 8**

Design Of Hydraulic Circuits Construction of Control Components : Director control valve – 3/2 way valve – 4/2 way valve – Shuttle valve – check valve – pressure control valve- Pressure reducing valve, sequence valve, Flow control valve

WEEK 12**Human Population And The Environment**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights

WEEK 13 - CYCLE TEST II**WEEK -14**

Value education – HIV / AIDS – women and child welfare

WEEK -15

Role of information technology in environment and human health

WEEK -16

Case studies & Revision

ME2301**THERMAL ENGINEERING****WEEK 1****GAS POWER CYCLES 9**

Otto, Diesel, Dual, Brayton cycles, Calculation of mean effective pressure, and air

WEEK 2

Standard efficiency -Actual and theoretical PV diagram of four stroke and two stroke engines

WEEK 3**UNIT II INTERNAL COMBUSTION ENGINES 9**

Classification - Components and their function - Valve timing diagram and port timing diagram

WEEK 4

Comparison of two stroke and four stroke engines - Carburettor system, Diesel pump and injector system. Performance calculation - Comparison of petrol and diesel engine

WEEK 5

Lubrication system and Cooling system - Battery and Magneto Ignition System

WEEK 6

Formation of exhaust emission in SI and CI engines

WEEK 7 CYCLE TEST –I**WEEK 8****UNIT III STEAM NOZZLES AND TURBINES 9**

Flow of steam through nozzles, shapes of nozzles, effect of friction, critical pressure ratio, supersaturated flow, Impulse and Reaction principles, compounding, velocity

WEEK -9

Diagram for simple and multi-stage turbines, speed regulations – Governors

WEEK 10**UNIT IV AIR COMPRESSOR 9**

Classification and working principle of various types of compressors, work of compression with and without clearance,

WEEK 11

Volumetric efficiency, Isothermal efficiency and Isentropic efficiency of reciprocating compressors

WEEK 12

Multistage air compressor and intercooling –work of multistage air compressor

WEEK 13 - CYCLE TEST –II**WEEK 14****UNIT V REFRIGERATION AND AIR CONDITIONING 9**

Vapour compression refrigeration cycle- super heat, sub cooling - Performance calculations - working principle of vapour absorption system, Ammonia –Water, Lithium bromide –water systems (Description only) - Alternate refrigerants

WEEK 7 CYCLE TEST I**WEEK 8**

Form Measurement - Measurement of screw threads-Thread gauges, floating carriage micrometer-measurement of gears-tooth thickness

WEEK 9

Constant chord and base tangent method-Gleason gear testing machine – radius measurements. Surface finish, straightness, flatness and roundness measurements

WEEK 10

Laser and Advances In Metrology. Precision instruments based on laser-Principles- laser interferometer-application in linear, angular measurements and machine tool metrology

WEEK 10

Coordinate measuring machine (CMM)- Constructional features – types, applications – digital devices- computer aided inspection

WEEK 11

Measurement Of Power, Flow And Temperature Related Properties - Force, torque, power:-mechanical, pneumatic,

WEEK 12

Hydraulic and electrical type-Flow measurement: Venturi, orifice, rotameter, pitot tube

WEEK 13 - CYCLE TEST II**WEEK 14**

Temperature: bimetallic strip, pressure thermometers,

WEEK 15

Thermocouples,.

WEEK-16

Electrical resistance thermister

WEEK 13 - CYCLE TEST II

WEEK 14

McKee's equation - Lubrication in journal bearings

WEEK 15

Calculation of bearing dimensions

WEEK-16

Design of flywheels involving stresses in rim and arm

ME2304 ENGINEERING METROLOGY AND MEASUREMENTS

WEEK 1

Concept Of Measurement General Concept – Generalized measurement system-Units and standards-measuring instruments

WEEK 2

Sensitivity, readability, range of accuracy, precision-static and dynamic response-repeatability

WEEK 3

Systematic and random errors-correction, calibration, interchangeability

WEEK 4

Linear And Angular Measurement - Definition of metrology- Linear measuring instruments: Vernier, micrometer, interval measurement, Slip gauges and classification

WEEK 5

Interferometry, optical flats, limit gauges- Comparators: Mechanical, pneumatic and electrical types, applications.

WEEK 6

Angular measurements: -Sine bar, optical bevel protractor, angle Decker – Taper measurements.

WEEK 15

Comparison between vapour compression and absorption systems - Air conditioning system: Types, Working Principles - Psychrometry, Psychrometric chart

WEEK-16

Cooling Load calculations - Concept of RSHF, GSHF, ESHF

ME2302

DYNAMICS OF MACHINERY

WEEK 1

Force Analysis - Rigid Body dynamics in general plane motion – Equations of motion - Dynamic force analysis

WEEK 2

Inertia force and Inertia torque – D'Alembert's principle the principle of superposition - Dynamic Analysis in Reciprocating Engines – Gas Forces - Equivalent masses

WEEK 3

Bearing loads - Crank shaft Torque - Turning moment diagrams – Fly wheels – Engine shaking Forces - Cam dynamics - Unbalance, Spring, Surge and Windup.

WEEK 4

Balancing - Static and dynamic balancing - Balancing of rotating masses - Balancing a single cylinder Engine –

WEEK 5

Balancing Multi-cylinder Engines - Partial balancing in locomotive Engines - Balancing linkages - balancing machines

WEEK 6

Degrees of freedom - Single degree of freedom - Free vibration - Equations of motion - natural frequency

WEEK 7 - CYCLE TEST I

WEEK 8

Types of Damping - Damped vibration critical speeds of simple shaft

WEEK 9

Torsional systems; Natural frequency of two and three rotor systems

WEEK 10

Forced Vibration - Response to periodic forcing - Harmonic Forcing - Forcing caused by unbalance

WEEK 11

Support motion – Force transmissibility and amplitude transmissibility - Vibration isolation.

WEEK 12

Mechanisms For Control - Governors - Types - Centrifugal governors - Gravity controlled and spring controlled centrifugal governors – Characteristics

WEEK 13 CYCLE TEST II**WEEK 14**

Affect of friction - Controlling Force - other Governor mechanisms.

WEEK 15

Gyroscopes - Gyroscopic forces and Torques - Gyroscopic stabilization - Gyroscopic effects in Automobiles

WEEK-16

Ships and airplanes & Revision

ME2303 DESIGN OF MACHINE ELEMENTS**WEEK 1****Steady Stresses And Variable Stresses In Machine Members**

Introduction to the design process - factor influencing machine design, selection of materials based on mechanical properties

WEEK 2

Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading

WEEK 3

Design of curved beams – crane hook and ‘C’ frame - Factor of safety - theories of failure – stress concentration – design for variable loading – Soderberg, Goodman and Gerber relations

WEEK 4

Design Of Shafts And Couplings Design of solid and hollow shafts based on strength, rigidity and critical speed – Design of keys and key ways

WEEK 5

Design of rigid and flexible couplings – Introduction to gear and shock absorbing couplings - design of knuckle joints

WEEK 6

Design of Fastners And Welded Joints Threaded fastners - Design of bolted joints including eccentric loading

WEEK 7 - CYCLE TEST I**WEEK 8**

Design of welded joints for pressure vessels and structures - theory of bonded joints

WEEK 9

Design of helical, leaf, disc and tensional springs under constant loads and varying loads

WEEK 10

Concentric torsion springs - Belleville springs – Design of Levers.

WEEK 11

Design of Bearings and Fly wheels Design of bearings sliding contact and rolling contact types

WEEK 12

Cubic mean load -Design of journal bearings