



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

(An ISO 9001: 2008 Certified Institution)

(Owned by Vel Trust)

(Approved Govt. of Tamil Nadu and affiliated to Anna University)



SYLLABUS

WEEKLY SCHEDULE

V SEMESTER

2014 - 2015

**DEPARTMENT OF MECHANICAL
ENGINEERING**

IV YEAR DEGREE COURSE

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WEEK DETAILS

SL.NO.	WEEK	FROM	TO
1	WEEK1	24-06-2014	27-06-2014
2	WEEK2	30-06-2014	04-07-2014
3	WEEK3	07-07-2014	11-07-2014
4	WEEK4	14-07-2014	18-07-2014
5	WEEK5	21-07-2014	25-07-2014
6	WEEK6	28-07-2014	01-08-2014
7	WEEK7	04-08-2014	08-08-2014
8	WEEK8	11-08-2014	14-08-2014
9	WEEK9	18-08-2014	22-08-2014
10	WEEK10	25-08-2014	28-08-2014
11	WEEK11	01-09-2014	05-09-2014
12	WEEK12	08-09-2014	12-09-2014
13	WEEK13	15-09-2014	19-09-2014
14	WEEK14	22-09-2014	26-09-2014
15	WEEK15	29-09-2014	01-10-2014
16	WEEK16	06-10-2014	10-10-2014
17	WEEK17	13-10-2014	17-10-2014
18	WEEK18	20-10-2014	24-10-2014
19	WEEK19	27-10-2014	31-10-2014

SUBJECT CONTENTS

SL.NO	SUBJECT CODE	SUBJECT NAME
THEORY		
1	GE 2021	Environmental Science & Engineering
2	ME 2301	Thermal Engineering
3	ME 2302	Dynamics of Machinery
4	ME 2303	Design of Machine Elements
5	ME 2304	Engineering Metrology & Measurements
6	ME 2305	Applied Hydraulics & Pneumatics
PRACTICAL		
7	ME 2306	Thermal Engineering Laboratory – I
8	ME 2307	Dynamics Laboratory
9	ME 2308	Metrology & Measurement Laboratory
10	ME 2309	CAD/CAM Laboratory

TEST / EXAM SCHEDULE

SL.NO	SUBJECT CODE	SUBJECT NAME	UNIT TEST I	UNIT TEST II	UNIT TEST III	UNIT TEST IV	UNIT TEST V
1	GE 2021	Environmental Science & Engineering	08/07/14 FN	30/07/14 FN	20/08/14 FN	09/09/14 FN	29/09/14 FN
2	ME 2301	Thermal Engineering	08/07/14 AN	30/07/14 AN	20/08/14 AN	09/09/14 AN	29/09/14 AN
3	ME 2302	Dynamics of Machinery	09/07/14 FN	31/07/14 FN	21/08/14 FN	10/09/14 FN	30/09/14 FN
4	ME 2303	Design of Machine Elements	09/07/14 AN	31/07/14 AN	21/08/14 AN	10/09/14 AN	30/09/14 AN
5	ME 2304	Engineering Metrology & Measurements	10/07/14 FN	01/08/14 FN	22/08/14 FN	11/09/14 FN	01/10/14 FN
6	ME 2305	Applied Hydraulics & Pneumatics	10/07/14 AN	01/08/14 AN	22/08/14 AN	11/09/14 AN	01/10/14 AN

SL.NO	SUBJECT CODE	SUBJECT NAME	MODEL EXAM
1	GE 2021	Environmental Science & Engineering	13-10-2014
2	ME 2301	Thermal Engineering	14-10-2014
3	ME 2302	Dynamics of Machinery	15-10-2014
4	ME 2303	Design of Machine Elements	16-10-2014
5	ME 2304	Engineering Metrology & Measurements	17-10-2014
6	ME 2305	Applied Hydraulics & Pneumatics	20-10-2014

GE2021 ENVIRONMENTAL SCIENCE AND ENGINEERING

WEEK 1

Unit I: 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 UNIT TEST-I

Unit II: 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 UNIT TEST-II

WEEK 7

Unit III: 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 8

Solid waste management: causes, effects and control measures of urban and industrial wastes – role of an individual in prevention of pollution

WEEK 9

Pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – urban / rural / industrial / agricultural

WEEK 10 UNIT TEST-III

Unit IV: 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 11

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 12

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 13 - UNIT TEST-IV

WEEK -14 REVISION 1-4 UNITS

WEEK -15

Unit V: Human Population And The Environment

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

WEEK -16

Value education – HIV / AIDS – women and child welfare - Role of information technology in environment and human health - Case studies.

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

ME 2301 THERMAL ENGINEERING

WEEK 1

GAS POWER CYCLES

Otto, Diesel, Dual, Brayton cycles,

WEEK 2

Calculation of mean effective pressure, and air Standard efficiency -

WEEK 3

Actual and theoretical PV diagram of four stroke and two stroke engines

WEEK 4 UNIT TEST-I

UNIT II INTERNAL COMBUSTION ENGINES

Classification - Components and their function - Valve timing diagram and port timing diagram 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 - Formation of exhaust emission in SI and CI engines

WEEK 6 UNIT TEST-II

WEEK 7 UNIT III STEAM NOZZLES AND TURBINES

Flow of steam through nozzles, shapes of nozzles, effect of friction

WEEK 8

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 TEST-III

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 - UNIT TEST-IV

WEEK 14 REVISION 1-4 UNITS

WEEK 15

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, Lithiumbromide –water systems (Description only) - Alternate refrigerants

WEEK 16

Comparison between vapour compression and absorption systems - Air conditioning system: Types, Working Principles - Psychrometry, Psychrometric chart - Cooling Load calculations - Concept of RSHF, GSHF, ESHF.

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

ME 2302 DYNAMICS OF MACHINERY

WEEK 1 UNIT I: Force Analysis –

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

WEEK 2

Inertia force and Inertia torque – D'Alemberts 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 UNIT TEST-I

UNIT II: Balancing

Static and dynamic balancing - Balancing of rotating masses -

WEEK 5

Balancing a single cylinder Engine – Balancing Multi-cylinder Engines

WEEK 6 UNIT TEST-II

WEEK 7 UNIT III: Partial balancing in locomotive Engines - Balancing linkages - balancing machines – Degrees of freedom

WEEK 8

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

WEEK 9

Types of Damping- Damped vibration critical speeds of simple shaft - Torsional systems; Natural frequency of two and three rotor systems

WEEK 10 UNIT TEST-III

UNIT IV: Forced Vibration

Response to periodic forcing - Harmonic Forcing

WEEK 11

Forcing caused by unbalance - Support motion

WEEK 12

Force transmissibility and amplitude transmissibility - Vibration isolation.

WEEK 13 UNIT TEST-IV

WEEK 14 REVISION 1-4 UNITS

WEEK 15

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

Affect of friction - Controlling Force - other Governor mechanisms.

WEEK-16

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

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

ME 2303 DESIGN OF MACHINE ELEMENTS

WEEK 1

UNIT I: 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 UNIT TEST-I

UNIT II: 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 UNIT TEST-II

WEEK 7

UNIT III Design of Fastners and Welded Joints

Threaded fastners

WEEK 8

- Design of bolted joints including eccentric loading

WEEK 9

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

WEEK 10 UNIT TEST-III

UNIT IV: DESIGN OF ENERGY STORING ELEMENTS

Design of various types of springs

WEEK 11

Optimization of helical springs -- rubber springs

WEEK 12

Design of flywheels considering stresses in rims and arms, for engines and punching machines

WEEK 13 - UNIT TEST-IV

WEEK 14 REVISION 1-4 UNITS

WEEK 15

UNIT V: DESIGN OF BEARINGS AND MISCELLANEOUS ELEMENTS

Sliding contact and rolling contact bearings -- Design of hydrodynamic journal bearings, McKee's Eqn., Sommerfield Number, Raimondi & Boyd graphs,

WEEK-16

Selection of Rolling Contact bearings -- Design of Seals and Gaskets -- Design of Connecting Rod.

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

ME2304 ENGINEERING METROLOGY AND MEASUREMENTS

WEEK 1

UNIT I: 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 UNIT TEST-I

UNIT II: Linear And Angular Measurement

Definition of metrology-Linear measuring instruments: Vernier, micrometer, interval measurement, Slip gauges and classification - Interferometers, optical flats, limit gauges

WEEK 5

Comparators: Mechanical, pneumatic and electrical types, applications. - Angular measurements: -Sine bar, optical bevel protractor, angle Decker – Taper measurements.

WEEK 6 UNIT TEST-II

WEEK 7

UNIT III: Form Measurement

Measurement of screw threads

WEEK 8

-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 UNIT TEST-III

UNIT IV: Laser and Advances In Metrology.

Precision instruments based on laser-Principles

WEEK 11

laser interferometer-application in linear, angular measurements and machine tool metrology

WEEK 12

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

WEEK 13 UNIT TEST-IV

WEEK 14 REVISION 1-4 UNITS

WEEK 15

UNIT V: Measurement Of Power, Flow And Temperature Related Properties –

Force, torque, power:-mechanical, pneumatic, Hydraulic and electrical type-Flow measurement: Venturi, orifice, rotameter, pitot tube

WEEK-16

Temperature: bimetallic strip, pressure thermometers, Thermocouples, Electrical resistance thermister

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM

ME 2305 APPLIED HYDRAULICS AND PNEUMATICS

WEEK 1

UNIT I: 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 UNIT TEST-I

UNIT II: Hydraulic System & Components

Sources of Hydraulic Power: Pumping theory – Pump classification – Gear pump, Vane Pump, piston pump - Construction and working of pumps – pump performance – Variable displacement pumps

WEEK 5

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 6 UNIT TEST-II

WEEK 7

UNIT III: Design Of Hydraulic Circuits

Construction of Control Components : Director control valve – 3/2 way valve – 4/2 way valve –

WEEK 8

Shuttle valve – check valve – pressure control valve- Pressure reducing valve, sequence valve, Flow control valve

WEEK 9

Fixed and adjustable, electrical control solenoid valves, Relays, ladder diagram - Accumulators and Intensifiers - Types of accumulators – Accumulators circuits, sizing of accumulators, intensifier – Applications of Intensifier – Intensifier circuit

WEEK 10 UNIT TEST-III

UNIT IV: Pneumatic Systems And Components

Pneumatic Components: Properties of air – Compressors – Filter, Regulator, and Lubricator Unit –

WEEK 11

Air control valves, Quick exhaust valves, and pneumatic actuators - Fluid Power Circuit Design, Speed control circuits, synchronizing circuit

WEEK 12

Penumo hydraulic circuit, Sequential circuit design for simple applications using cascade method.

WEEK 13 - UNIT TEST-IV

WEEK 14 REVISION 1-4 UNITS

WEEK 15

UNIT V: Design of Pneumatic Circuits

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

WEEK 16

Simple circuits, Introduction to Electro Hydraulic Pneumatic logic circuits ladder diagrams, PLC applications in fluid power control - Fluid power circuits; failure and troubleshooting

WEEK-17- UNIT TEST V

WEEK-18- MODEL EXAM