

DEPARTMENT OF TECHNOLOGY
THIRD YEAR B.TECH

Scheme of Teaching and Examination with effect from academic year 2015-16
Semester – V (Mechanical Engineering)

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
		L	T	P	Credits	Theory			Practical		
						Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
1.	Machine Design – I	03	01	-	04	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
2.	Theory Of Machine – II	03	-	-	03	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
3.	Energy Engineering	03	-	-	03	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
4.	Manufacturing Engg. - II	03	-	-	03	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
5.	Heat and Mass Transfer	03	-		03	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
6.	Theory Of Machine – II Lab.	-	-	02	01	-----	-----	-----	EOE	50	20
7.	CAD – Lab - I	-	-	02	01	-----	-----	-----	IOE	-	-
						-----	-----	-----	EPE	50	20
8.	Workshop Practice - III	-	-	02	01	-----	-----	-----	EPE	50	20
9.	Heat and Mass Transfer Lab	-	-	02	01	-----	-----	-----	IPE	--	--
						-----	-----	-----	EPE	50	20
10.	Seminar	-	-	04	02	-----	-----	-----	IOE (Based on seminar)	50	20
11.	Manufacturing Engg II Lab.	-	-	02	01	-----	-----	-----	IPE	-	-
						-----	-----	-----	IOE	50	20
	Total	15	01	14	23	-----	500	-----	-----	300	-----
	Presentation and Communication Techniques (Audit Course)	02	01	-	03	-----	-----	-----	IPE (GD&PI)	50	20

Total Credits: 24

Total Contact Hours/Week: 30 hrs

Note:

#: Minimum 40% marks must be secured in SEE to pass that head.

Tutorials and practical shall be conducted in batches with batch strength not exceeding 18 students.

CIE – Continuous Internal Evaluation, SEE – Semester End Examination,

IPE – Internal Practical Evaluation, EPE–External Practical Examination,

IOE– Internal Oral Evaluation, EOE–External Oral Examination

Note: There will be an industrial tour in the first week of the semester VI. This tour will cover at least two visits to reputed **Mechanical Industries**. The report of the visits during the tour is required to be submitted by the students. This particular activity is for 50 marks as an Internal Oral Evaluation (IOE) which is included in Semester VI.

DEPARTMENT OF TECHNOLOGY
THIRD YEAR B.TECH

Scheme of Teaching and Examination with effect from academic year 2015-16
Semester – VI (Mechanical Engineering)

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
		L	T	P	Credits	Theory			Practical		
						Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
1.	Machine Design – II	04	-	-	04	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
2.	Control Engineering	04	-	-	04	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
3.	Internal Combustion Engines	04	-	-	04	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
4.	Metrology and Quality Control	04	-	-	04	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
5.	Industrial Engineering and Management	03	-	-	03	CIE	50	20	-----	-----	-----
						SEE	50	20	-----	-----	-----
6.	Metrology and Quality Control Lab	-	-	02	01	-----	-----	-----	EOE	50	20
7.	Internal Combustion Engines Lab	-	-	02	01	-----	-----	-----	IPE	--	--
						-----	-----	-----	EPE	50	20
8.	CAM Lab	-	-	02	01	-----	-----	-----	IOE	50	20
						-----	-----	-----	EPE	--	--
9.	Machine Design – II Lab	-	-	02	01	-----	-----	-----	IOE	50	20
						-----	-----	-----	EOE	50	20
10.	Research Methodology and Mini Project (Audit Course)	01	-	02	--	-----	-----	-----	----	----	----
11.	Report of Industrial Tour	-	-	-	-	-----	-----	-----	IOE (seminar & oral)	50	20
Total		19	--	08	23	-----	500	-----	-----	300	-----

Total Credits: 2

Total Contact Hours/Week: 30 hrs

Note:

#: Minimum 40% marks must be secured in SEE to pass that head.

Tutorials and practical shall be conducted in batches with batch strength not exceeding 18 students.

CIE – Continuous Internal Evaluation, SEE – Semester End Examination,

IPE – Internal Practical Evaluation, EPE–External Practical Examination,

IOE– Internal Oral Evaluation, EOE–External Oral Examination

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester V)
MACHINE DESIGN – I

Teaching Scheme: L: 3 hrs/week
: T: 1 hrs/week

Credits: 4

Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit 1

Fundamental aspect of design

The meaning of design, Engineering design, Phases of design, design consideration, stress and strain consideration, factor of safety, standardization, preferred series, material selection – weighted point method.

Unit 2

Design against static load

Commonly used engineering materials and their important mechanical properties – Cast Iron, Mild Steel, Non-ferrous materials like Copper and Brass, Stress-strain relationship, stresses due to bending and torsional load, design of cotter/knuckle, Turn-buckle joints, eccentric loading and theories of elastic failure.

Unit 3

Design of screw and fasteners

Design of bolted and threaded joints, design of power screws, introduction to re-circulating ball screw. subjected to eccentric loading.

Unit 4

Design of shafts, keys and coupling

Shafts subjected to bending and torsion, types of keys and their design, design of rigid and flexible couplings, ASME code

Unit 5

Design of mechanical springs

Design against static, design of compression helical spring, end styles, helical torsion spring, design of multi leaf spring, Nipping.

Unit 6

Design of welded joints

Types of welded joints, eccentrically loaded joints, welded joints subjected to bending moment.

Text Books

1. Shigley J.E. and Mischke C.R. – “Mechanical Engineering Design” McGraw Hill Publ.Co. Ltd.
2. Bhandari V.B. – “Design of Machine Elements” – Tata McGraw Hill Publ. Co. Ltd.

Reference Books

1. Spotts M.F. and Shoup T.E. – “Design of Machine Elements” – Prentice Hall International.
2. Black P.H. and O. Eugene Adams – “Machine Design” - McGraw Hill Book Co. Ltd.
3. William C. Orthwein – “Machine Component Design” – West- publishing Co. and Jaico Publ. House.
4. “Design Data” – P.S.G. College of Technology, Coimbatore.
5. Juvinal R.C. – “Fundamentals of Machine Components Design” – John Wiley and Sons.
6. Hall A.S.; Holowenko A.R. and Laughlin H.G. – “Theory and Problems of Machine Design” – Schaum’s outline series.

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester V)
THEORY OF MACHINES – II

Teaching Scheme: L: 3 hrs/week			Credits: 3
Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit 1

Belt Drives

Introduction, Type of belts, Tension ratio in belts, Initial tension, Open & cross belt drive, Length of belt, Power transmitted by belt, centrifugal effect on belt, initial tension, creep.

Unit 2

Cams and followers.

Types of cams and followers, terminology, motions of follower: SHM, uniform velocity, uniform acceleration and retardation, Cycloidal displacement, velocity and acceleration diagrams.

Unit 3

Friction Clutches, Brakes and Dynamometer

Introduction, Types of clutch, uniform wear and Uniform pressure for the clutch, Types of brakes, effect of braking of a vehicle, dynamometers.

Unit 4

Gyroscope:

Introduction, Angular velocity, acceleration, Gyroscopic couple, Effect of gyroscopic couple on aero plane, Naval ship, Stability of two wheels and four wheels vehicles.

Unit 5

Balancing:

Static and dynamic balance, balancing of revolving several masses on several planes, Balancing of reciprocating masses in single and multi cylinder engines, balancing Machines.

Unit 6

Mechanical Vibrations:

Fundamentals, undamped and damped free vibrations of single degree freedom system, Critical speed of shafts for longitudinal transverse and torsional vibrations.

Text Books:

1. Bevan Thomas “The Theory of Machines” CBS Publishers and Distributors Ratan S. S. “Theory of Machines”, Tata McGraw Hills
2. Dr. Bansal R. K. “Theory of Machines” Laxmi Publications Pvt. Ltd. New Delhi
3. Rao J.S. & Dukkupati R.V. , “Mechanisms and Machine Theory” New Age International Pvt. Ltd.

Reference Books:

1. Ulicker Jr. J.J., Penock G.R. & Shigley J.E. “Theory of Machines and Mechanisms” Tata McGraw Hills
2. Ghosh Amitabha & Mallik Asok Kumar, “Theory of Mechanisms and Machines” east- West Press Pvt. Ltd. New Delhi
3. Ramamurthy, “Mechanics of Machines” , Narosa Publishing House
4. Kimbrell J.T., “Kinematics Analysis and Synthesis” McGraw – Hill International Editons.

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester V)
ENERGY ENGINEERING

Teaching Scheme: L: 3 hrs/week			Credits: 3
Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit 1:

Solar Energy

Present status of energy scenario. Renewable and non-renewable energy sources. Availability, limitations, application of solar energy.

Solar Radiation

Structure of the sun, energy radiated by the sun, angular relationship of earth, and sun position, measurement of solar radiation. Derivations and Numerical Problems

Unit 2

Flat Plate Collectors

Types and constructional details of flat plate collector, energy-balance for a flat plate collector, simple equation and performance curves, selection of flat plate collector.

Solar Concentrator

Limitations of flat plate collectors, various types of concentrators, their advantage, simple, thermal energy-balance equations, heliostats, selection of various materials for concentrators and reflecting surfaces.

Unit 3

Solar Heating Systems

Solar water and space heating systems, passive solar heating systems, solar heating economics, solar air-heating systems, typical solar ponds.

Solar Distillation Systems

Various solar stills and selection, constructional details, Solar Energy Storage Systems.

Solar Electric Power

Solar photovoltaic system, materials used and their performance, types of solar thermal power plant, working substance used, and temperature required various systems used.

Unit 4

Wind Energy

Availability of wind, various types of windmills and their constructional details and performance study, Power generated by windmills. Offshore Windmills. Derivations and Numerical Problems.

Unit 5

Geothermal Energy Sources and application of geothermal energy, various types of geothermal power plants.

Tidal Energy

Tidal energy available in India, suitable locations, study of various tidal energy power plants, and characteristics of turbines required.

Introduction to **Wave Energy**, Phenomenon of wave generation.

Unit 6:

Bio gas

Chemistry of biogas generation variables affecting simple gas plants, types of digestors their working and construction, application of biogas, use of bio-gas, case study of “pura” village bio gas electricity generation”.

Fuel Cells

Introduction, Types and Applications

Text Books:

1. Sukhatma S.P., “ Solar Energy”, Tata McGraw Hill Publishing Company Limited, New Delhi, 1994
2. Rai G.D., “ An Introduction to Power Plant Technology”, Khanna Publishers, Third Edition, Delhi, 1996
3. Bansal N K and others “ Non-Conventional Energy Sources”.
4. S. Rao and Dr. B. B. Parulekar, Energy Technology, Khanna Publishers, New Delhi.

Reference Books:

1. Krieth and Krieder, “Principles Of Solar Engineering”, Tata McGraw Hill Publishing Company Limited, New Delhi, 1994
2. Wakil M.M., “ Power Plant Technology”, McGraw Hill International Book Company, 1984.
3. Pai B.K., and Ramprasad M.S., “ Power generation through renewable sources of energy”.
4. Garg H.P. and Prakash J., “ Solar Fundamental and Application” Tata McGraw Hill Publishing Company Limited, New Delhi, 1997

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester V)
MANUFACTURING ENGINEERING - II

Teaching Scheme: L: 3 hrs/week			Credits: 3
Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit 1

Non-Conventional Machining-I

Introduction, Classification. Introduction, Principle, Working and Applications of Chemical Machining, Electrochemical Machining, Abrasive Jet Machining, Ultrasonic Machining, water jet machining.

Unit 2

Non-Conventional Machining-II

Introduction, Principle, Working and Applications of Electric Discharge Machining, Electron Beam Machining, Ion Beam Machining, Plasma Arch Machining, Laser Machining- Cutting and Welding

Unit 3

Theory of Metal Cutting

Cutting tools, tool life and cutting fluids, tool geometry, concept of speed, feed, depth of cut, cutting action, cutting forces, estimation of cutting forces, Merchant's circle of forces, Measurement of cutting forces & power required, machinability, tool life.

Unit 4

Surface Treatment Processes

Need of surface treatment, various surface treatment processes, Electroplating, phosphating, metal spraying, anodising etc. Surface Hardening processes, Effects of surface treatment processes.

Unit 5

Design of Jigs and Fixtures

Definition, elements, Types of location, their selection, clamping. Types of Jig bushes, indexing methods. Types of Jigs & fixtures, Design of Jigs & fixtures, fabrication methods, costing, Economic aspect of tool design, material selection for bushes.

Unit 6

Gear Manufacturing

Gear Geometry, Gear cutting process- forming and generation, gear cutting, milling, hobbing, gear shaping, shaving, lapping, grinding.

Introduction to Numerical Control & Machining Centers

Introduction to NC, CNC, DNC machines, comparison with conventional machine tools, Basic principles of NC machines, Advantages and Disadvantages.

Introduction to Automats

Text books:

1. Chapman, 'Workshop technology vol. I,II & III, Edward Arnold Publication Ltd. London
2. Hajara Chaudhari S.K., 'Workshop Technology, Vol. I & II', Media Prom & Publication, Mumbai..
3. R. K. Jain, 'Production technology', Khanna Publications.
4. Hoffman: 'Introduction to Jigs and Fixtures', Galgotia Publishers.

Reference Books:

1. HMT Hand book- Production Technology
2. P. C. Sharma, ' Production Engineering', Khanna Publications.

3. S. E. Rusinoff: 'Manufacturing Processes', Times India Press. Doyle, 'Manufacturing Processes and Materials for engineers, Prentice Hall of India Press.
4. S. K. Basu, 'Fundamentals of Tool Design', Oxford IBH.

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester V)
HEAT AND MASS TRANSFER

Teaching Scheme: L: 3 hrs/week

Credits: 3

Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit-1

Introduction

Modes/laws of heat transfer, Thermal Conductivity, Electrical Analogy in conduction, derivation of Generalized heat conduction equation in Cartesian coordinates. Its reduction to Fourier, Laplace and Poisson's equation. thermal diffusivity. Generalized heat conduction equation in cylindrical and spherical co-ordinates (no derivation).

Unit-2

One dimensional steady state heat conduction

Heat conduction through a plane wall, cylindrical wall and sphere. Heat conduction through a composite slab, cylinder and sphere, effect of variable thermal conductivity, critical radius of insulation, Economic insulation, and thermal contact resistance. One dimensional steady state heat conduction with heat generation for plane wall, cylinder and sphere.

Unit-3

Extended Surfaces

Types and Applications of Fins. Heat transfer through Extended surfaces, derivation of equations for temperature distribution and heat transfer through fins of constant cross-section area. Effectiveness and efficiency of a fin. Errors in the measurement of temperature in a thermo-well.

Unit-4

Convection

Local and average convective coefficient. Hydrodynamic and thermal boundary layer. Laminar and turbulent flow over a flat plate and in a pipe. Friction factor, laminar and turbulent flow over a flat plate. Drag and drag co-efficient.

Free and Forced Convection

Dimensional analysis in free and forced convection. Physical significance of the dimensionless numbers related to free and forced convection. Empirical correlations for heat transfer in laminar and turbulent flow over a flat plate and in a circular pipe. Empirical correlations for free convection heat transfer over horizontal, vertical plate cylinder.

Heat Exchangers

Classification, log mean temperature, analysis of heat exchangers (LMTD and NTU method)

Unit-5

Radiation

Fundamental concepts, Black body radiation-Planck's distribution law, Wien's displacement law and the Stefan-Boltzmann law. Surface emission, radiative properties of a surface. The grey, black and real surface. Radiation shape factor, use of shape factor charts, Kirchoff's law, Lambert's cosine law. Heat exchange between non-black bodies, heat exchange between two infinitely parallel planes and cylinders. Radiation shields, heat exchange by radiation, between two finite black surfaces. Gas radiation (elementary treatment only). Solar radiation, irradiation, radiation potential, electrical network method of solving radiation problems.

Unit-6

Mass Transfer

Introduction, Modes of mass transfer, Analogy between heat and mass transfer, Mass diffusion (Mass basis, Mole basis), Fick's law of diffusion, Significance of various dimensions numbers.

Text Books

1. J.P. Holman: Heat Transfer; McGraw Hill Book Company, New York.
2. Gupta and Prakash: Engineering Heat Transfer, New Chand and Bros., Roorkee (U.P.) India.
3. R.C. Sachdeva: Fundamentals of Engineering Heat and Mass Transfer, Wiley Eastern Ltd., India.

Reference Books

1. Incropera and Dewitt: Fundamentals of Heat and Mass Transfer, John Wiley and Sons, New York.
2. Frank Kreith: Principles of Heat Transfer, Harper and Row Publishers, New York.
3. Donald Q. Kern: Process Heat Transfer, Tata McGraw Hill Publishing Company Ltd., New Delhi.

Shivaji University, Kolhapur
Department of Technology
Second Year B. Tech (MECHANICAL ENGINEERING) (Semester V)
Laboratory
THEORY OF MACHINES – II Lab

Teaching Scheme: P: 2 hrs/week

Credits: 1

Evaluation Scheme: EOE: 50

Minimum Passing Marks: 20

The students should perform the following experiments. (Any Eight)

1. To determine the belt slip.
2. To study frictional properties of clutch/brake lining and to determine experimentally torque carrying capacity and slip of the clutch or brake.
3. To determine the coefficient of friction and wear of a given material.
4. Study of mechanical/transmission type dynamometer.
5. Verification of Gyroscopic principle and determination of gyroscopic couple
6. Study of principle of static and dynamic balancing machines.
7. Determination of natural frequency of transverse vibrations of a bar.
8. Determination of damping coefficient of torsional vibrations.
9. Determination of node point of two rotor system.
10. Determination of critical speed of shaft of single rotor.

Assignments:

The students should submit the following assignments as Term Work.
To draw cam profile for various types of follower motion

Shivaji University, Kolhapur
Department of Technology
Second Year B. Tech (MECHANICAL ENGINEERING) (Semester V)
Laboratory
COMPUTER AIDED DRAFTING (CAD) – I Lab

Teaching Scheme: P: 2 hrs/week

Credits: 1

Evaluation Scheme: EPE: 50

Minimum Passing Marks: 20

- 1 Basic command to draw 2- D objects like line, point, circle, arc, ellipse, polygon, polyline, spline etc.
2. Edit Commands: Erase, extension, break, fillet, chamfer, trim, scale, etc
3. Commands like line type, Dimension, text style etc
4. Viewing and other: Zoom, pan, mirror, rotate, move objects, arrange blocks, offset etc.
5. Hatching of sections.
6. Use of layers in drawing.
7. Plotting of drawing.
8. Introduction to 3- D modeling – sketcher, part design, assembly and drafting workbenches.
9. Modify commands , view port, UCS, etc.

LAB WORK

1. Computer aided drafting of four simple components and print out of the same.
 2. One assignment on drawing of details and assembly containing 6 - 8 component with tolerance, machining symbol etc. and plotting the same.
 3. One assignment on 3-D drawing of one simple component and plotting its 2-D views along with 3 D object drawing.
 4. Redraw given production drawing and to interpret it.
- Note: Latest computer aided drafting software version like AutoCAD and any 3D modeling software are to be used.
- Instructions for practical examination
7. Every student shall be given one problem each.
 8. Oral shall be based on the problem solved in AutoCAD and the journal.

Shivaji University, Kolhapur
Department of Technology
Second Year B. Tech (MECHANICAL ENGINEERING) (Semester V)
Laboratory
WORKSHOP PRACTICE -III

Teaching Scheme: P: 2 hrs/week

Credits: 1

Evaluation Scheme: EPE: 50

Minimum Passing Marks: 20

The load of workshop practice III will be allotted to the teaching staff and will be assisted by workshop staff for completing the jobs.

- 1) One job of plain turning, taper turning, external threading and knurling operation with its process sheet.
- 2) Description on thread manufacturing processes and gear train calculations.
- 3) Journal Consists of Following: -
 - a. Process sheet and tool layout on Capstan /Turret lathe.
 - b. Setting of milling machine for gear cutting.
 - c. Study and demonstration of grinding machine (Surface, cylindrical and center less).
 - d. Study and demonstration of shaper/planer (mechanisms and stroke).
- 4) Industrial visit to study gear manufacturing processes.

Assessment of journal based on above term work and industrial visit report is to be done by the teaching staff member assisted by workshop staff.

[Jobs carry 15 marks and journals carry remaining 10 marks and 25 marks for external practical exam job.]

Shivaji University, Kolhapur
Department of Technology
Second Year B. Tech (MECHANICAL ENGINEERING) (Semester V)
Laboratory
HEAT AND MASS TRANSFER LAB

Teaching Scheme: P: 2 hrs/week

Credits: 1

Evaluation Scheme: EPE: 50

Minimum Passing Marks: 20

Students have to perform following experiments: (Any Eight)

1. Determination of thermal conductivity of insulating powder.
2. Determination of thermal conductivity of a given metal rod.
3. Determination of thermal conductivity of a given liquid.
4. Determination of thermal conductivity of composite slab.
5. Determination of heat Transfer Coefficient in Natural Convection from Cylinder.
6. Determination of heat Transfer Coefficient in Forced Convection from Cylinder.
7. Determination of Critical Heat Flux
8. Study of Performance of parallel and counter flow heat exchanger
9. Determination of emissivity of given surface
10. Determination of Stefan Boltzmann Constant.

Shivaji University, Kolhapur
Department of Technology
Second Year B. Tech (MECHANICAL ENGINEERING) (Semester V)
Laboratory
SEMINAR

Teaching Scheme: P: 4 hrs/week
Evaluation Scheme: IOE: 50

Credits: 2
Minimum Passing Marks: 20

Topic

Any topic of mechanical engineering application may be a seminar topic. The seminar may be based on proposed project work also. Seminar Load:- Maximum 9-10 students in one batch, Maximum 9-10 students shall work under one Faculty Member Group of one student is not allowed under any circumstances

Seminar Term :

Seminar report should be of 25 to 35 pages. For standardization of the seminar reports the following format should be strictly followed.

1 Page size : Trimmed A4

2. Top Margin : 1.00 Inches

3. Bottom Margin : 1.32 Inches

4. Left Margin : 1.5 Inches

5. Right Margin : 1.0 Inches

6. Para Text : Font - Times New Roman; 12 point

7. Line Spacing : 1.5 Lines

8. Page Numbers : Right aligned and in footer.

9. Headings : Font Times New Roman; 12 point New Times Roman, 14 point, Boldface

10. Certificate : All students should attach standard format

Of The entire seminar should be documented as one chapter. References should have the following format For Books:

1. "Title of Book"; Authors; Publisher; Edition; For Papers:

2. "Title of Paper"; Authors; Conference Details; Year.

Marks

1 Seminar Report: 25

2 Presentation: 25

All students have to present their seminars individually in front of the faculties

Shivaji University, Kolhapur
Department of Technology
Second Year B. Tech (MECHANICAL ENGINEERING) (Semester V)
Laboratory

MANUFACTURING ENGINEERING II LAB

Teaching Scheme: P: 2 hrs/week

Credits: 1

Evaluation Scheme: IOE: 50

Minimum Passing Marks: 20

1. Assignments based on unit 1 to 4.
2. Design and drawing of sheets on units no. 5 and 6.

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECHANICAL ENGINEERING) (Semester V)
Laboratory

PRESENTATION AND COMMUNICATION TECHNIQUES

Teaching Scheme

Examination Scheme

Lectures: 2 Hrs/week + TUTORIAL 1 hr/week

UNIT 1

Communication in a Business Organization

Internal (Upward, Downward, Horizontal, Grapevine, Problems, Solutions) External Communication, Strategies for conducting successful business meetings, documentation (notice, agenda minutes) of meetings. Introduction to modern communication techniques (for e.g. e-mail, internet, video conferencing etc), Legal & ethical issues in communication (intellectual property rights, patents)

UNIT 2

Advanced Technical Writing

- a. Report – Writing and presentation: Definition and importance of reports. Qualities of Reports, language and style in reports, type of reports, formats (letter, memo, and project- reports), and methods of compiling data. Computer-aids
- b. Technical Paper Writing
- c. Writing Proposals

UNIT 3

Interpersonal Skills

Introduction to emotional intelligence, Motivation, Negotiation and conflict-resolution Assertiveness, Leadership, Team-building, Decision-making, And Time-management.

UNIT 4

Interview Techniques

Preparing for job interviews, verbal and non-verbal communication during interview. Observation sessions and role-play techniques may be used to demonstrate interview strategies.

UNIT 5

Group Discussion

Dynamics of Group Behaviour, Techniques for effective participation.

Assignments:

a) Written

1. Assignments on Communication topics
2. Assignments on Report writing
3. Assignments on Interpersonal Skills

b) One class test

- c) **Oral:** Practical sessions on Group-discussion / Interview Skills /Project Presentation / Power point Presentation.

Break up of IOE Marks

- a) Assignments Written: 20 marks
 - b) Test: 10 marks
 - c) Performance in Oral: 20 marks
- Total 50 marks

Books Recommended:

A. For classroom teaching

1. Fred Luthans, 'Organizational Behavior' McGraw Hill International Edition
2. Lesiker and Petit 'Report writing For Business' McGraw Hill International Edition
3. Huckin and Olsen 'Technical Writing and Professional Communication' – McGraw Hill International Edition
4. Wallace and Masters 'Personal Development for life and Work' (workbook) Thomson Learning Herta Murphy 'Effective Business Communication' Herta Murphy
5. Herbutwildebraudt- McGraw Hill

B. For Additional Reading:

1. Lewicki, Saunders, Minton 'Essential of Negotiation' McGraw Hill International Edition
2. Hartman Lemay 'Presentation Success' Thomson learning.
3. Kitty O Locker & Kaczmark – 'Business Communication Building Critical Skills' McGraw Hill
4. Vikas Gupta: Comdex Computer Course Kit, IDG Books Pvt, Ltd.
5. Heller & Handle: The Essential Manager's Manual – Dorleen Kindercey
6. The Sunday Times 'Creating Success Series'
 1. Develop your Assertiveness
 2. Make every Minute Count
 3. Successful Presentation Skills
 4. How to motivate people
 5. Team building.

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester VI)
MACHINE DESIGN – II

Teaching Scheme: L: 4 hrs/week			Credits: 4
Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit- 1

Design against fluctuating load

Stress concentration, fatigue failure, endurance limit, notch sensitivity, Goodman and Soderberg diagrams, and modified Goodman diagram, fatigue design under combined stresses.

Unit- 2

Sliding contact bearing

Modes of lubrication, hydrostatic step bearing, and Reynolds's equation, bearing design, selection of parameters, and construction details of bearings, Introduction of tribological considerations in design

Unit - 3

Rolling contact bearing

Types, static and dynamic load carrying capacity, load-life relationship, selection of bearing from manufactures catalogue, comparison of sliding and rolling bearing, mounting of bearings.

Unit- 4

Design of spur gears

Design of spur gears, force analysis, gear tooth failures, number of teeth, face width, beam strength of gear tooth, effective load on gear tooth, gear design for maximum power transmission.

Unit- 5

Design of helical gears

Virtual number of teeth, tooth proportions, force analysis, beam strength of helical gears, effective load on gear tooth, wear strength of helical gears, Design of bevel gears.

Unit- 6

Design of worm gears:

Worm gear geometry and nomenclature, Force and efficiency analysis, Bending and surface fatigue strength, Worm gear thermal considerations, Methods of lubrications.

Text Books:

1. Bhandari V.B. – “ Design of Machine Elements” – Tata McGraw Hill Publ. Co. Ltd.
2. Shigley J.E. and Mischke C.R. – “Mechanical Engineering Design” McGraw Hill Publ. Co. Ltd.

Reference Books:

1. Spotts M.F. and Shoup T.E. – “ Design of Machine Elements” – Prentice Hall International.
2. Black P.H. and O. Eugene Adams – “ Machine Design” – McGraw Hill Book Co.Ltd.
3. William C. Orthwein – “ Machine Component Design” – West- publishing Co. and Jaico Publ. House.
4. “Design Data” – P.S.G. College of Technology, Coimbatore.
5. Juvinal R.C. – “Fundamentals of Machine Components Design” – John Wiley and Sons.
6. Hall A.S.; Holowenko A.R. and Laughlin H.G. – “ Theory and Problems of Machine Design” – Schaum's outline series

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester VI)
CONTROL ENGINEERING

Teaching Scheme: L: 4 hrs/week

Credits: 4

Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit 1

Introduction to Automatic Control: Generalized Control System Types, Open Loop and Closed Loop, Linear and Non-Linear, Time Variant and Time invariant Systems with examples. Advantages of Automatic Control Systems, Hydraulic/Pneumatic System, Hydraulic Servomotor, Jet – Pipe Amplifier, Pneumatic Amplifier. Thermal System, Gear Train

Unit 2

Block Diagram Algebra and Mathematical Modeling: Rules for Reduction of Block Diagram, Control System Components – Tachometer, D.C. Servomotor, Stepper Motor, Mathematical Model of Control System: Mechanical Translational Systems, Rotational System, Grounded Chair Representation, Electrical Elements, Analogous Systems, Force – Voltage Analog, Force – Current Analog, Mathematical Model of Liquid Level System

Unit 3

Transient Response : General Form of Transfer Function, Concept of Poles and Zeros, Distinct, Repeated and Complex Zeros. Response of systems (First and Second Order) to Various Inputs (Impulse, Step, Ramp & Sinusoidal). Damping Ratio and Natural Frequency. Transient Response Specification

Unit 4

Stability and Root Locus Technique: Routh's Stability Criteria, Significance of Root Locus, Construction of Root Loci, General Procedure, Effect of Poles and Zeros on the System Stability.

Unit 5

State Space Analysis: System Representation, Direct, Parallel, Series and General Programming, Conversion of State Space Model to Transfer Function.

Unit 6

Frequency Response Analysis: Frequency Response Log Magnitude Plots and Phase angle Plots, Gain Margin, Phase Margin, Evaluation of Gain 'K', Polar Plots. System Compensation: Types of Compensators, Lead, Lag, Lead-Lag Compensators.

REFERENCE BOOKS :

1. Control System Engineering : R Anandnatarajan, P. Ramesh Babu, SciTech Publi.
2. Control Systems: A. Anand Kumar, Prentice Hall Publi.
3. Automatic Control Engineering : F.H. Raven (5th ed.), Tata McGraw Hill Publi.
4. Modern Control Systems: K Ogata, 3rd Ed, Prentice Hall Publi.
5. Automatic Control Systems: B.C. Kuo, 7th Ed, Willey India Ltd./ Prentice Hall Publi.
6. Automatic Control Engineering: D. Roy and Choudhari, Orient Longman Publi. Calcutta
7. Modern Control Engineering K.Ogata Pearson Education

Third Year B. Tech (MECH. ENGINEERING) (Semester VI)

I. C. ENGINES

Teaching Scheme: L: 4 hrs/week

Credits: 4

Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit 1

Thermodynamic cycles

Concept, Types, Fuel air cycles and their significance, Comparison with air standard cycles, Actual cycles, Time and heat loss factors, Exhaust blow down.

Unit 2

Fuel Supply System

System Components, Carburetor, Fuel injection in S.I. and C.I. engines, Introduction to supercharging and turbo charging.

Unit 3

Fuels and Combustion

Basic families of hydrocarbon fuels, Refining process, Qualities & properties of fuels, Rating of fuels, Alternate liquid and gaseous fuels, Combustion phenomenon in S.I and C.I. Engines, Valve timing and port timing diagram, Pre-combustion, Knock, Detonation, Combustion chambers.

Unit 4

Testing and Performance

Determination of IP, BP, FP, Mean effective pressure, Fuel consumption, Air Consumption, Engine efficiencies, Performance characteristics, Energy balance.

Unit 5

Emissions and Controls

Air pollution due to I.C. Engines, Emissions, Euro norms, Emission control methods, Catalytic converters.

Unit 6

Engine's Other Systems

Starting, Ignition, Governing, Lubrication, Cooling and Exhaust systems, fuel supply systems.

Text Books:

1. V. Ganesan, "Internal Combustion Engines", Tata McGraw Hill, Second Edition.
2. Mathur & Sharma, "A Course in Internal Combustion Engines ", R. P. Dhanapat Rai Pub. 1997
3. Heywood, "I.C. Engines Fundamentals", McGraw Hill

Reference Books:

1. Edward E. Obert, "Internal Combustion Engines and Air Pollution", Internal Educational Pub, 1973
2. Kirpal Singh, "Automobile Engineering Vol. I & II", Standard Publishers Crouse W.H., "Automotive Mechanics", McGraw Hill

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester VI)
METROLOGY AND QUALITY CONTROL

Teaching Scheme: L: 4 hrs/week

Credits: 4

Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit 1

Measurements : International standards of length-Line and end measurement, Need of measurement, possible errors in measurement, slip gauges. **Tolerances and gauging** : Unilateral and bilateral tolerances, Limits, Fits, Types of Fits, IS specifications of limits. Importance of limits, System in mass production, limit gauges used for plain and taper works.

Unit 2

Magnification : Principles and characteristics of measuring instruments, Mechanical, Optical, electrical, Pneumatic method of magnification, different types of Verniers, Micrometers, Dial gauges, Mechanical and pneumatic, Types of comparators. Use of comparators in inspection. **Measurement of angles, tapers and radius** : Bevel Protractor, Spirit level, Clinometers, angle Decker, standard balls and rollers for angle measurement, angle slip gauges, radius measurement of circular portion, measurement of concave and convex surface radius.

Unit 3

Interferometry : Principle of Interferometry and application in checking of flatness, angle and height. **Straightness and Flatness** : Straight edge, use of level beam comparator, autocollimator testing of flatness of surface plate(Theoretical treatment only), surface roughness.

Unit 4

Surface finish : Types of textures obtained during machine operation, range of C.L.A. value in different operations in numerical assessment of surface finish (B.I.S. Specifications of C.L.A. value)-sample length of different machining operations. Direction of lay, texture,symbols , instruments used in surface finish assessment.

Quality control: Concept of Quality and quality control, elements of quality & its growth, purpose, setup, policy & objective, factors controlling & quality of design and conformance, balance between cost and quality and value of quality. Specification of quality ,planning through trial lots and for essential information.

Unit 5

Measurement of Spur Gears : Run out checking, Pitch measurement, profile checking, backlash checking, tooth thickness measurement, alignment checking, errors in gears, checking of composite errors. **Measurement of External Threads** : Different errors in screw threads, measurement of forms of thread with profile projector, pitch measurement, measurement of thread diameter with standard wire, screw thread micrometer.

Unit 6

Statistical Quality Control : Importance of statistical method in quality control, measuring of statistical control variables and attributes. Measurement/inspection, different types of control charts(X Bars, R, P. charts) and their constructions and their application. **Acceptance Sampling** : Sampling inspection & percentage inspection, basic concept of sampling inspection, operating characteristic curves, conflicting interests of consumer and producer, producer and consumers risks, AWQL, LTPD, ADGL, single and double sampling plans.

Reference Books

1. Engg. Metrology- I.C. GUPTA, Dhanpat Rai Publications.
2. Practical Engg. Metrology- Sharp K.W.B. Pitman, London
3. Statistical quality control-A.L. Grant, McGraw Hill International, New York.
4. Engg. Metrology-R.K.Jain, Khanna Publisher Metrology-Taher
5. Statistical Quality control-R.C. Gupta I.S. 919/1963 I.S. 2709/1964
6. Engg. Metrology-Hume K.G.,MC Donald, Technical & Scientific ,London
7. Quality Control and Industrial Statistics – Duncon A.J., D.B. Taraporevela & Co. Bombay.
8. Statistical quality Control – MahajanM., Dhanpat Rai & Sons, Delhi.
9. Engineering Metrlogy-2nd Ed. By P. Narayana, Scitech Publication
10. Metal working & Metrology By P. Narayana et.al Scitech Publication
11. Quality control 7 ed D.H. Besterfield Pearson education
12. Mechanical Measurements: Beckwith , Magangoni and Lien Hard, Pearson.

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECH. ENGINEERING) (Semester VI)
INDUSTRIAL ENGINEERING AND MANAGEMENT

Teaching Scheme: L: 3 hrs/week

Credits: 3

Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	50	50	40

Unit 1

Introduction to Industrial Engineering: Definition, Scope, Responsibilities, Important contributors to I.E., Tools and techniques of I.E. **Production Planning and Control:** Sales Forecasting – Need, types and various techniques, Elements of PPC, PPC activity cycle. **Planning –** Pre-requisites of process planning, Steps in process planning, Factors affecting process planning, Process selection, Machine selection, Make or buy decision, Line Balancing, Plant capacity, Machine capacity and machine selection planning. **Loading & Scheduling –** Machine loading procedure, Concept of scheduling, Single machine scheduling, Job shop scheduling, n jobs one machine, n jobs two machines, two jobs – m machine cases. **Production Control –** Control function and its objectives, mechanism used in effecting production control

Unit 2

Inventory Control: Different Models And Inventory Systems, MRP, Make or Buy decision. **Network Techniques:** CPM and PERT, Construction, Time cost trade off. **Facility Planning:** Location model, Principles & objectives of plant layout. **Tools & techniques of PL Material Handling:** Objectives and principles, Material Handling Equipments, Selection, types and application.

Unit 3

Productivity: Concept, objectives, Factors affecting productivity, Tools and techniques to improve productivity, Productivity measurement. – Models. **Value Engineering:** Concept, steps, Applications.

Unit 4

Work Study: Definition, objectives and steps **Method Study:** Recording techniques, principles of motion economy, Cases on methods improvement. **Work Measurement:** Steps, Performance rating, various techniques, Allowances and standard time estimation, Work Sampling, MOST Techniques.

Unit 5

Human Factors Engineering: Physiological work measurement Scope, application, Load analysis.

Unit 6

Job Evaluation and Merit Rating- Methods, Incentive schemes.

Reference Books:

1. Maynard. H.B – Industrial Engineering Hand Book, McGraw Hill Book Company, New York
2. J. Adam EE , RJ Ebert Production and operation management- Prentice Hall Englewood Cliff, N. Riggs. J L - Production system, planning, analysis and control – John Weily and sons, New York
3. David Sumanth, Productivity Engineering and Management- Tata McGraw Hill, New Delhi.
4. Bernes, R.L Motion and Time Study, Design and measurement of Work, John Weily India
5. Introduction to Work Study- International Labour Office Geneva
6. L.C.Jhamb- Work study and Ergonomics.
7. Miles Lawrence- Techniques of value Analysis and engineering- McGraw Hill Book Company, New York.
8. Samuel Eilon – Production planning and control.
9. James Dilworth, Production and operation management- McGraw Hill Book Company, New York.

10. Martand Telsang Industrial Engineering and Production Management- S Chand & Co, New Deldi.
11. Srinath. L.S. – PERT and CPM.
12. Industrial Engineering and Management by Vishwanath SCITECH publication
13. Industrial Engineering and Management by Arun Vishwanath SCITECH publication

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECHANICAL ENGINEERING) (Semester VI)
Laboratory

METROLOGY AND QUALITY CONTROL LAB

Teaching Scheme: P: 2 hrs/week

Credits: 1

Evaluation Scheme: EOE: 50

Minimum Passing Marks: 20

Any Six experiments based on below referred areas

- 1) Study and use of linear measuring Instruments
- 2) Study and Use of comparators
- 3) Study & Use of Angle Measuring instruments
- 4) Screw Thread measurement
- 5) Gear measurements & inspection.
- 6) Use of Optical profile projector
- 7) Study & Use of Control charts
- 8) Operating characteristics curves

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECHANICAL ENGINEERING) (Semester VI)
Laboratory
I. C. ENGINES LAB

Teaching Scheme: P: 2 hrs/week
Evaluation Scheme: EPE: 50

Credits: 1
Minimum Passing Marks: 20

Test Group: (any five)

- 1 Test on four stroke Diesel Engine.
- 2 Test on four stroke Petrol Engine.
- 3 Test on two stroke petrol engine. (Variable Speed Test)
- 4 Morse Test on multi cylinder Engine
- 5 Visit to a engine manufacturing company / repairing unit
- 6 Test on computer controlled I.C. Engine
- 7 Measurement of exhaust emissions of SI / CI engines.
- 8 Test on variable compression ratio engine

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECHANICAL ENGINEERING) (Semester VI)
Laboratory
CAM LAB

Teaching Scheme: P: 2 hrs/week
Evaluation Scheme: IOE: 50

Credits: 1
Minimum Passing Marks: 20

1. Study of Advanced machine tools.
2. Study of numerical control programming for machines tools.
3. Study of various software packages.
4. Study of Automation systems in manufacturing.
5. Study of FMS
6. Study of Agile manufacturing
7. Study of lean manufacturing systems
8. Industrial visit.

Shivaji University, Kolhapur
Department of Technology
Third Year B. Tech (MECHANICAL ENGINEERING) (Semester VI)
Laboratory
MACHINE DESIGN – II Lab

Teaching Scheme: P: 2 hrs/week

Credits: 1

Evaluation Scheme: IOE: 50

Minimum Passing Marks: 20

EOE: 25

Minimum Passing Marks: 20

A) Total two design project

A detail design report and A 2 Size sheet containing working drawing of details and assembly of project based on any relevant mechanical system consisting of

- i) Spur gear/ Helical gear..
- ii) Bevel gear / Worm and worm wheel.

B) Assignments based on

- i) Four problems on fluctuating loads.
- ii) Study of Ball bearing mountings and its selection preloading of bearings.
- iii) Four problems on design of gear drives including all types gears
- iv) Industrial visit based on above syllabus..

Shivaji University, Kolhapur
Department of Technology
Second Year B. Tech (MECHANICAL ENGINEERING) (Semester VI)
Laboratory

RESEARCH METHODOLOGY AND MINI PROJECT

Teaching Scheme: L: 1 Hrs/week P: 2hrs ; week

UNIT-1

Introduction to Research Methodology

Objective of Research, Types of Research, Research Methods and Methodology, Scientific method of Research, Research Process

UNIT-2

Research Problem and Research Design

Research Problem and Selection of Research Problem, Need for defining the Problem, Techniques for defining a Problem, Development of hypothesis

Meaning and Need of Research Design , Features of a good Research Design, Types of Research Design-Exploratory, Descriptive and Experimental Research

UNIT-3

Referencing Information Sources

Using secondary sources of information: using an Encyclopedia, bibliography card, Translation card catalogue information, periodic indexes and usage, compiling a preliminary bibliography; Referencing documentation sources: styles of footnotes, end notes etc., model bibliographic entries

UNIT-4

Sampling Design

Census and Sample survey, Implication of Sample design, Steps in Sampling Characteristics of a good Sample design, Types of Sample design

UNIT-5

Scaling Techniques & Data Collection

Attitude Measurement and Measurement in Research, Measurement Scales, Scaling, Scale Classification Bases, Concept of important Scaling Techniques; Data Collection: Primary and Secondary data, Observation Method, Survey Method, Collection of data through Questionnaire and Schedule distinction, Selection of appropriate method of Data Collection

UNIT-6

Processing Operations and Report Writing

Processing Operations, Problem in Processing, Types of Analysis, Application of some

Multivariate tools of data analysis

Report Writing: Writing and Formulating of Reports, Steps in Report Writing, Types of Report

REFERENCES BOOKS:

1. C.R.Kothari “Research Methodology” New Age International (P) Ltd.
2. D.K.Bhattachary “Research Methodology”; Excel Books
3. Goodday &Hack “Research Methodology”

MINI PROJECT

The purpose of this particular exercise is to promote self-study, critical thinking and independent research ability. Students have to initiate their own small conceptual or practical based projects individually or as a team of no more than 2 members. While making this exercise it is expected that the knowledge acquired by them through Research Methodology subject is applied by them

Carrying out mini project work will certainly help the students to for satisfactory and successful complete their major project in the final year.

Project Completion & Assessment

A 15 to 20-pages report is to be written upon completion of the activity. For team projects, each member has to write his own report. The report should include academic content such as the background, objectives, product/system description, the work done, the achievements and difficulties encountered.

Students will deliver a seminar and will make the demonstration of their work.

Shivaji University, Kolhapur
Department of Technology
Second Year B. Tech (MECHANICAL ENGINEERING) (Semester VI)
Laboratory
REPORT ON INDUSTRIAL TOUR

IOE: 50 Marks

Visit to Industry for studying application of various industrial engineering and technological applications with subsequent report.