SHIVAJI UNIVERSITY ,KOLHAPUR, VIDYNAGAR 416 004

S.E. (MECHANICAL ENGINEERING)(REVISED) PART : I

WITH EFFECT FROM THE ACADEMIC YEAR JUNE/JULY 2008-2009

Sr. No.	Subject	L	TUT	P	Dr	Total	PT	TW	OE	POE	Total
1	Engineering Mathematics -III	3	-	-	-	3	100	-	--	--	100
2	Applied Thermodynamics	3	-	2	-	5	100	25	--	25	150
3	*Electrical Technology And Computer Programming C++	4	-	2	-	6	100	50	--	--	150
4	Machine drawing @	3	-	2	-	5	100	50	--	--	150
5	Manufacturing Processes	3	-	2	-	5	100	25	--	--	125
6	Fluid Mechanics	3	-	2	-	5	100	25	--	25	150
7	Workshop Practice III (Foundry & Processing)	-	-	2	-	2	-	25	--	--	25
	Total	**19**	**-**	**12**	**-**	**31**	**600**	**200**	**--**	**50**	**850**

* Practicals to be conducted alternate weeks. For Electrical Technology And computer Programming C++ Term work assessment consist of 25 marks for each Electrical Technology And computer Programming C++ separately. And combined marks out of 50 obtained by each student should be forwarded to Shivaji University, Kolhapur

* Question paper should consist of Two sections of 50 marks each for Electrical Technology And computer Programming C++ And A separate answer book must be supplied for theory Examination for each section Electrical Technology And computer Programming C++

@ Theory paper of 04 (four hour) Durations

NOTE
Theory Paper Duration UNLESS Specified, always it will be 03 (THREE) Hours Duration

SHIVAJI UNIVERSITY ,KOLHAPUR, VIDYNAGAR 416 004

S.E. (MECHANICAL ENGINEERING)(REVISED) PART : II

WITH EFFECT FROM THE ACADEMIC YEAR JUNE/JULY 2008-2009

Sr. No.	Subject	L	TUT	P	Dr	Total	PT	TW	OE	POE	Total
1	Analysis of Mech. Elements	3	-	2*	-	4	100	25	--	--	125
2	Numerical Methods	3	-	2	-	5	100	25	--	--	125
3	Metallurgy	3	-	2	-	5	100	25	25	--	150
4	Machine Tool	3	-	-	-	3	100	-	--	--	100
5	Theory of Machines – I @	3	-	2*	-	4	100	25		--	125
6	Fluid & Turbo Machinery	3	-	2	-	5	100	25	--	25	150
7	Computer Aided Drafting	-	-	2	-	2	-	25	--	25	50
8	Workshop Practice IV	-	-	2	-	2	-	25	--	--	25
	Total	**18**	**-**	**12**	**-**	**30**	**600**	**175**	**25**	**50**	**850**

- Practicals to be conducted alternate weeks

@ Theory paper of 04 (four hour) Durations.

NOTE
Theory Paper Duration UNLESS Specified, always it will be 03 (THREE) Hours Duration

SHIVAJI UNIVERSITY ,KOLHAPUR, VIDYNAGAR 416 004

T.E. (MECHANICAL ENGINEERING)(REVISED) PART : I

WITH EFFECT FROM THE ACADEMIC YEAR JUNE/JULY 2009-2010

Sr. No.	Subject	L	TUT	P	Dr	Total	PT	TW	OE	POE	Total
1	Theory of machine II	3	-	2*	-	4	100	25	25	--	150
2	Heat and mass transfer	3	-	2	-	5	100	25	--	25	150
3	Machine design I	3	-	2*	-	4	100	25	--	--	125
4	Metrology & Quality Control	3	-	2*	-	4	100	25	25	--	150
5	Manufacturing Engineering	3	-	2*	-	4	100	25	--	--	125
6	Control Engineering	3	-	2	-	5	100	25	--	--	125
7	Workshop Practice V $	-	-	2	-	2	-	-	-	--	--
8	CAD / CAM Laboratory	-	-	2	-	2	-	25	-	-	25
	Total	**18**	**-**	**12**	**-**	**30**	**600**	**175**	**50**	**25**	**850**

* Practicals to be conducted alternate weeks.

   1) Theory of Machine II & Machine Design I

   2) Manufacturing Engineering & Metrology & Quality control

$ Term work assessment of composite job will be done at end
  of T.E.(MECH.) PART -II In Work shop Practice VI

NOTE
Theory Paper Duration UNLESS Specified, always it will be 03 (THREE) Hours Duration

SHIVAJI UNIVERSITY ,KOLHAPUR, VIDYNAGAR 416 004

T.E. (MECHANICAL ENGINEERING)(REVISED) PART : II

WITH EFFECT FROM THE ACADEMIC YEAR JUNE/JULY 2009-2010

Sr. No.	Subject	L	TUT	P	Dr	Total	PT	TW	OE	POE	Total
1	Machine Design II	3	-	2	-	5	100	25	25	--	150
2	Energy Engineering	3	-	2*	-	4	100	25	--	--	125
3	I.C.Engines	3	-	2	-	5	100	25	--	25	150
4	Industrial Fluid Power	3	-	2	-	5	100	25	--	--	125
5	Computer Integrated Manufacturing	3	-	-	-	3	100	-	--	--	100
6	Industrial Management And Operation Research	3	-	2*	-	4	100	25	--	--	125
7	Workshop Practice VI $	-	-	2	-	2	-	25	--	25	50
8	Testing & Measurement	-	-	2	-	2	-	25	--	--	25
	Total	**18**	**-**	**12**	**-**	**30**	**600**	**175**	**25**	**50**	**850**

* Practicals to be conducted alternate weeks.

Industrial training of minimum two (2) weeks should be done after T.E. (II) and its

Assessments will be done in B.E. (I) based on its report

$ Term work assessment of Work shop practice-V, Part of composite job will be

Done at end of T.E.(MECH.) PART -II In Work shop Practice VI

NOTE
Theory Paper Duration UNLESS Specified, always it will be 03 (THREE) Hours Duration

SHIVAJI UNIVERSITY ,KOLHAPUR, VIDYNAGAR 416 004

B.E. (MECHANICAL ENGINEERING)(REVISED) PART : I

WITH EFFECT FROM THE ACADEMIC YEAR JUNE/JULY 2010-2011

Sr. No.	Subject	L	TUT	P	Dr	Total	PT	TW	OE	POE	Total
1	Refrigeration & Air Conditioning	3	-	2	-	5	100	25	--	25	150
2	Mechanical system design	3	-	2	-	5	100	25	25	--	150
3	Finite elements method	3	-	2	-	5	100	25	--	--	125
4	Automobile Engineering	3	-	2	-	5	100	25	25	--	150
5	Elective – I	3	-	2	-	5	100	25	--	25	150
6	Seminar	-	-	2	-	2	-	50	--	--	50
7	Project *	-	-	4	-	4	-	25	--	--	25
8	Industrial Training @	-	-	-	-	-	-	50	--	--	50
	Total	**15**	**-**	**16**	**-**	**31**	**500**	**250**	**50**	**50**	**850**

Sr. No.	ELECTIVE-I
01	Total Quality Management
02	Failure Analysis And Reverse Engineering
03	Experimental Mechanics
04	Human Values
05	Industrial Product Design
06	Fluid Dynamics & C.F.D. Fluid Dynamics & Cfd

* Project – Assessment Of Project Will Be Based On Work Diary
  And @ 20 Pages Of Report.

@ Industrial training of minimum two (2) weeks should be completed in T.E. (II) and its Assessments will be done in B.E. (I) based on its report of same batch of project under guidance of faculty member

NOTE
Theory Paper Duration UNLESS Specified, always it will be 03 (THREE) Hours Duration

SHIVAJI UNIVERSITY ,KOLHAPUR, VIDYNAGAR 416 004

B.E. (MECHANICAL ENGINEERING)(REVISED) PART : II

WITH EFFECT FROM THE ACADEMIC YEAR JUNE/JULY 2010-2011

Sr. No.	Subject	L	TUT	P	Dr	Total	PT	TW	OE	POE	Total
1	Mechatronics	3	-	2	-	5	100	25	25	--	150
2	Industrial Engineering	3	-	2	-	5	100	25	25	--	125
3	Power Plant Engineering & Economics	3	-	2	-	5	100	25	--	--	125
4	Elective –II	3	-	2	-	5	100	25	--	--	125
5	Elective III	3	-	2	-	5	100	25	--	--	125
6	Project	-	-	6	-	6	-	75	--	100	175
	Total	**15**	**-**	**16**	**-**	**31**	**500**	**200**	**50**	**150**	**850**

Sr.No.	ELECTIVE-II	ELECTIVE –III
01	Enterprise And Resource Planning	Industrial Automation
02	Production Management	Cryogenics
03	Robotics	Nano Technology
04	Industrial Tribology	Noise And Vibrations
05	Machine Tool Design	Jigs And Fixture Design
06	MEMS	P.L.C.And SCADA Programming

NOTE
Theory Paper Duration UNLESS Specified, always it will be 03 (THREE) Hours Duration

S.E. (MECH)(REVISED) – Part I
1. ENGINEERING MATHEMATICS – III

Teaching Scheme   **Examination Scheme**
Lectures   : 3 hours/week   Theory :   100
marks(3HrsDuration

SECTION – I

Unit 1 Linear Differential Equations: Linear Differential Equations with constant coefficients, Homogeneous Linear differential equations,   [5 hours]

Unit 2 Applications of Linear Differential Equations: Applications of Linear Differential Equations with constant coefficients to Whirling of Shafts and Oscillations of a spring (Free oscillations, Damped Oscillations, Forced oscillations without damping).   [5 hours]

Unit 3 Partial differential equations: Four standard forms of partial differential equations of first order.   [5 hours]

Unit 4 Application of Partial differential equations: Wave Equation. One dimensional heat flow equation, Two dimensional heat flow Laplace equation (Steady State).

[4 hours]

SECTION – II

Unit 1 Laplace Transform: Definition, Transforms of elementary functions, Properties of Laplace transforms, transforms of derivatives, transforms of integral, transforms of periodic function.   [5 hours]

Unit 2 Inverse Laplace transforms: Inverse Laplace transforms by using partial fractions, Convolution theorem, Applications to linear differential equations with constant coefficients(Initial value problems).   [5 hours]

Unit 3 Vector Calculus: Differentiation of vectors, Velocity and acceleration, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function, Irrotational and Solenoidal vector fields.

[5 hours]

Unit 4 Fourier series: Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansion of odd and even periodic functions, Half range series

[5 hours]

Nature of Question paper:

1. There will be two sections carrying 50 marks each.
2. There will be four questions in each section and three question
   should be attempted from each section.

Reference Books:
1. A text book of Applied Mathematics: Vol. I, II and III by J. N. Wartikar & P. N. Wartikar , Vidyarthi Griha Prakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal.
3. Advanced Engineering Mathematics by Erwin Kreyszig.
4. A textbook of Engineering Mathematics by N. P. Bali, Ashok Saxena and N. Ch. S. N. Iyengar- Laxmi Publication, Delhi.
   5 Advnaced Engineering Mathematics 2e M.D.Greenberg Pearson Education

S.E. (MECH)(REVISED) PART-I

2. APPLIED THERMODYNAMICS

Teaching Scheme:
Lectures: 3 hrs/week
Practical: 2 Hrs. per week

Examination Scheme:
Theory Paper   : 100 marks (3 hrs. duration)
Term Work   : 25 Marks.
Practical and Oral Examination: 25 Marks

SECTION - I

1. Review of Laws of Thermodynamics: (3)

Zeroth law, first law & Second law of thermodynamics, Equivalence & Corrolories of Second Law, Numerical treatment on second law.

2.Entropy: (3)

Clausius inequality, entropy as a property of system, entropy of pure substance. T-s and h-s planes, entropy change in a reversible and irreversible processes, increase of entropy principle, calculation of entropy changes of gases and vapours, Statement of third law of thermodynamics.

3. Availability: (3)

Available and unavailable energy: availability of a closed and open system, availability of work and heat reservoirs, Anergy, energy and exergy and simple numericals.

4. Properties of Pure Substances: (3)

Properties of steam, use of steam table and Mollier chart, Deviation of real gases from ideal gases, Equations of state- Vander Waal, Beattie-Bridgemen, Virial & Diterici's equations, P-V-T surfaces & triple point of water.(Descriptive treatment)

5. Vapour Power Cycles:
(4)

Carnot cycle using steam, limitations of Carnot cycle Rankine cycle, representation on T-s and h-s planes, thermal efficiency, specific steam consumption. Work ratio, effect of steam supply pressure and temperature, condenser pressure on the performance. (Numerical Treatment)

6. Steam Condensers : (4)

Functions, elements of condensing plant, types of steam condensers, surface and jet condensers, comparison, vacuum efficiency, condenser efficiency, loss of vacuum, sources of air leakages, methods of leak detection, air extraction methods, estimation of cooling water required, capacity of air extraction pump,air ejectors.

SECTION II

7. Steam Nozzles: (5)

Functions, shapes, critical pressure ratio, maximum discharge condition, effect of faction, design of throat and exit areas, nozzle efficiency, velocity coefficient, coefficient of discharge, supersaturated flow, degree of under-cooling and degree of super saturation, effects of super saturation.

8. Steam Turbines : (15)

8.1 Principles of operation, classification, impulse and reaction steam turbine, compounding of steam turbines.

8.2 Flow through impulse turbine blades, velocity diagrams, work done, efficiencies, end thrust, blade friction, influence of ratio of blade speed to steam speed on efficiency of single and multistage turbines and its condition curve and reheat factors.

8.3. Flow through impulse reaction blades, velocity diagram, and degree of reaction, parson's reaction turbine, and backpressure and pass out turbine.

8.4 Reheat regenerative steam power cycles.

8.5. Governing of steam turbines. Josses in steam turbines, performance of steam turbines.

8.6. Function of diaphragm, glands, turbine troubles like erosion, corrosion, vibration, fouling etc.

TERM WORK

Any ten experiments from the list given below :

1. Significance and relevance of lubrication properties and systems.
2. Test on grease penetrometer and dropping point apparatus.
3. Test on carbon residue, cloud and pour point apparatus.
4. Test on Redwood Viscometer.
5. Test on Aniline point apparatus.
6. Determination of flash and fire point of a lubricating oil.
7. Demonstration of water tube and fire tube boilers
8. Demonstration of boiler mountings and accessories
9. Trial / Demonstration of on steam calorimeters
10. Trial / Demonstration of condenser and study of cooling towers
11 Trial / Demonstration of on steam calorimeters
12 Trial on steam power plant
13. Report on industrial visit to a steam power plant

Instructions for practical examination

1. Four to five experiments shall be selected for practical examination.
2. The number of students for each practical set up would not be more than four students.
3. Oral will be based oft the practical performed in the examination and the experiments included in the journal.

BOOKS

1. Kumar and Vasandani, Thermal Engineering, Metropolitan Book Co,, Delhi,

2. Mathur and Mehta, Thermal Engineering, Jain Bros. Publishers, Delhi.

3. Ballaney P.L., Thermal Engineering, Khanna Publishers, New Delhi.

4. P.K. Nag., Engineering Thermodynamics., Tata Mc Graw Hill ,New Delhi

5. Holman, Thermodynamics, Mc Graw Hill, London

6. Engineering Thermodynamics, Gupta & Prakash, Nemichand & Sons

8. Cengel & Boles Thermodynamics: an engineering approach, 3/e, Tata McGraw-Hill, New Delhi

9. R. K. Rajput,Thermal Engineering , Laxmi Publications

10. Wylen Van, G. J. & Sonntag R. E. , Fundamentals of Classical Thermodynamics. John Wiley & Sons

11. R. Yadav, Steam & Gas Turbines CPH Allahabad.

12 Fundamentals of Engineering Thermodynamics- 4e MORAN Wiely India Text book

13 Applied Themodynamics 5e Estop Mc conkey Pearson education

14 Engineering Thermodynamics G.rogers Yon Mayhew 4e Pearson education

15 Fundamentals of Thermodynamics- 6e R.E.Sonntag,C. Borgnakke, V. Wylen Wiely India Pvt.Ltd.

S.E. (MECH) (REVISED) PART-I

3. ELECTRICAL TECHNOLOGY AND COMPUTER PROGRAMMING C++

Teaching Scheme: Examination Scheme:
Lectures: 4 Hrs/week   *Theory Paper : 100 marks (3 Hrs
duration)
Practical: 2 hrs/week   50 marks for section –I
                                                             50 marks for section-II

                                                   $Term work   : Total 50 marks
                                                             25 marks for section -I
                                                             25 marks for section-II

ELECTRICAL TECHNOLOGY(SECETION)

Teaching Scheme:- Lectures: 2 Hrs/week Practical:- 2 hrs/Alternateweek

SECTION – I

1. DC Motor   (5)

Speed Control of dc Series & Shunt Motor by Armature control, Flux control, series – parallel control method (Numerical Treatment), Electric braking of dc motor by dynamic, regenerative & counter current braking method. Three point, four point & electronic starters of DC shunt motors.

2. Three Phase Induction motors   (3)

Principle, construction, type, operation ,characteristics & applications of Three Phase Induction motors,starting motors

3. Speed Control & Braking of Three Phase Induction motors   (4)

   Speed control of Three Phase Induction motors from stator side- pole changing , frequency   control by electrical & electronic method ; From rotor side – slip power recovery, slip regulator   Braking – dynamic, regenerative & counter current braking method.

4. Electric Drives (3)

Comparison between Group drive & Individual drive. Selection of motors for lathe, milling machine,planning machine, shaping machine, rolling mills, traction, conveyors and lifts, CNC machines etc.

5. Measurement of power & Power factor correction (7)

Measurement of active, reactive& apparent power in 3 phase circuit by two Wattmeter method. Causes & disadvantages of low power factor. Powe factor correction by using static capacitor (numerical treatment).Principle ,construction and application of PMMC,Electronic energy meter

6.Types of electric heating- Introduction, resistance ovens, High frequency eddy current heating
(2)

TERM WORK

Any SIX experiments from the following;

1) Case study of any one industrial application.

2) Speed control of D. C. Shunt motor by flux control method.

3) Speed control of D. C. Shunt motor by rheostatic control method

4) Load test on D. C. Shunt motor,

5) Efficiency calculation of resistance ovens.6) Calibration of single-phase energy meter

7) Power factor correction of thee phase load using static capacitors.

8) Study of PMMC, Moving iron, Electro-dynamic instruments.

BOOKS

1. S.L. Uppal, Electrical power, DBS Publishers

2. Kothaii / Nagrath. Basic Electrical Engineering, 2/e, Tata McGraw Hill New Delhi

3.Text book of Electrical Technology By B.L.Theraja (Vol. I & II)

SECTION-II

COMPUTER PROGRAMMING USING C++ (SECTION)

Teaching Scheme   Lecturers:- 2 **Hrs/ Week** Practicals:- **2 Hrs/ Alternate Week**

1) **Object-Oriented programming**: Introduction, Basic concepts, Benefits, object-oriented languages, Applications. (5)

2) **Classes & Objects**: Introduction, structures & classes, Declaration of class, Member functions; defining the object of a class; accessing a member of a class; Array of class objects. Use of Pointers with Arrays and Function   (5)
3) **Inheritance**: Introduction, single inheritance; Types of base classes: Direct, Indirect; Types of derivation: Public, Private, Protected.   (3)
4) **Overloading**: Function overloading with various data types, arguments; operator overloading: assignment operator; arithmetic & comparison operators.   (3)
5) **Polymorphism**: Virtual functions; Abstract Base Classes, Constructor under Inheritance, Destructor under inheritance.   (3)

Term Work:

1) Minimum 1 program on Input/Output & arithmetic expressions, hierarchy of operators, branching and loop control statements

2) Minimum 1 program on pointers with Arrays and Function.

3) Minimum 1 program on structures.

4) Minimum 2 programs on Class & Objects

5) Minimum 2 programs on Inheritance

6) Minimum 2 programs on Overloading

7) Minimum 2 programs on Polymorphism

 (***Practical & Oral:** Compilation and execution of any one program on OOPS concept followed by oral)

Reference Books:

1) Object Oriented Programming - E. Balguruswami (Tata McGraw hill Publication)

2) Let us C++ - Yashwant Kanitkar (BPB Publication).

3)C++ Programming 7ed Alstevans wiely India

4)C++/CLI Sivkumar wiely India

5)ProfessionaL c++ Solter wiely India

$ Practicals to be conducted alternate weeks. For Electrical Technology And computer Programming C++ Term work assessment consist of 25 marks for each Electrical Technology And computer Programming C++ separately. And combined marks out of 50 obtained by each student should be forwarded to Shivaji University, Kolhapur

* Question paper should consist of Two sections of 50 marks each for Electrical Technology And computer Programming C++ And A separate answer book must be supplied for theory Examination for each section Electrical Technology And computer Programming C++

S.E. (MECH)(REVISED) PART-I
4. MACHINE DRAWING--I

Teaching Scheme:
Lectures: 3 hrs/week
Practical: 2 hrs/week

Examination Scheme:
Theory Paper : 100 marks (4 hrs. duration)
Term work   : 50 marks

SECTION-I

1. Study of B.I.S. (Bureau of Indian Standards) Conventions.   (5)

Significance and importance of BIS Conventions, Drawings sheet sizes and layout recommended by BIS. Conventional representation of engineering Materials, spur helical and bevel gears, worm and worm wheel, rack and pinion, gear assemblies, type of helical, disc and leaf springs. Internal and external threads, square head, spline shaft, diamond knurling BIS conventions for sectioning, type of sections, exceptional cases. BIS methods of linear- and angular dimensioning. Symbolic representation of welds as per BIS for representation of above conventions.

2. Interpenetration of Solids   (6)

Introduction, interpenetration of prism with prism, prism with cylinder, prism with cone, prism with pyramids. (Prisms and Pyramids limited up to rectangular), cylinder with cylinder, Cone with cylinder.

3. Sketching of machine component   (8)

Importance of sketching and entering proportionate dimensions on sketches. Sketches of nut, bolts (square and hexagonal flanged nuts, lock nuts, dome nut, capstan nut, wing nut, castle nut, split pin, square headed bolt, cup headed bolt, T-headed bolt, Rag foundation bolt, stud, washer. Various types of rivets and riveted joints, Various types of keys, Socket and spigot (Cotter joint) , Knuckle (pin) joint, Muff coupling, Protected and unprotected Flanged, coupling, universal coupling, solid and bush bearing. Plummer block (pedestal bearing), foot step bearing. Flat and V-belt pulleys, Fast and loose pulleys, speed cone pulleys, Pipe joint for C.I. Flanged, socket and spigot type pipe joint. Union pipe joint and standard pipe-fitting. Students should know the applications of above machine components.

SECTION II

4. Auxiliary Projection   (5)

Projection on auxiliary vertical and horizontal plane, Auxiliary projection of simple machine components.

5. Limits, fits and tolerances   (6)

Significance of system of limits and fits. Definitions, Types, Recommendations and selections, Tolerances of form and position, surface finish symbols as per BIS,

Selection and entering of all these symbols with reference to details and assembly drawings, Tolerancing an individual dimensions of details drawing.

6. Details and assembly drawing   (9)

To prepare detail drawings from given assembly drawing. To prepare assembly drawing from given drawing of details. The no. of parts is limited to ten to twelve. Preparation of detailed drawing from the given details such as: Screw jack, Tools post of center lathe, Tail stock. Cross head Assembly, Jigs and fixtures, connecting rod and piston of I.C. Engines, Gland and stuffing box, Crossed head assembly, Valve assembly, etc. Assembly selected should include different types of sections.

TERM WORK

Sheet no. 1. Based on BIS conventions mentioned in section 1.1

Sheet no. 2: Based on sketching (Free hand drawing) of various machine components mentioned in section I.. 3

Sheet no. 3 : To draw details drawing from given assembly.

Sheet no. 4 .To draw details and assembly drawing by taking actual measurements and entering limits, fits, tolerances, surface finish symbols, geometrical requirements etc.

Sheet no. 5 : Sheet based on auxiliary view.

Sheet no. 6 : Sheet based on interpenetration of solids.

Note:Use first angle of projection method only.

BOOKS

1. IS: SP46- Engineering drawing practice for schools and colleges, B.I.S. Publications.

2. IS: 696- Code of practice for general engineering drawings B.I.S. Publications.

3. IS : 2709-Guide for selection of fits, B.I.S. Publications.

4. IS:919- Recommendation for limits and fits for Engineering, B.I.S. Publications

5. IS: 8000- Part I, II. III. TV, geometrical tolerencing of technical drawings -- B.I.S. Publications.

6. P.S. Gill,   Machine Drawing., S.K. Kataria and Sons , Delhi.

7. N. D. Bhatt,. Machine Drawing. Charotor Publication House, Bombay.

&. N. Sidheshwsr . P. Kannaiah and V.V. S. Sastry. Machine Drawing, Tata McGraw Hill, New Delhi.

9. R.K. Dhavan, Machine Drawing., S. Chand and Company.

10. Narayana, Kannaiah and Venkata reddv, Production Drawing, New Age International

11 N.D.Junnarkar Machine Drawing 1 st print Pearson Education

S.E. (MECH) (REVISED) PART-I

5. MANUFACTURING PROCESSES

Teaching Scheme
Lectures: 3 Hrs /week
duration)

Examination Scheme:
Theory Paper: 100 marks (3 hrs

Term work: 25 Marks

SECTION I

1. Introduction to Material s for manufacturing: Materials, Compositions and shaping processes used (**Elementary treatment only**)

   - Ferrous alloys such as Steels, cast irons

   - Non ferrous alloys such as Al- alloys, Cu-alloys, Ni- alloys,

   - Non- metals such as Plastics, Ceramics and Composites

   - Tooling materials -Tool steels: cold work tool steel hot work tool steels, high speed tool steel (HSS), special purpose tool steels,

   - Selection of materials and Specifications based on -IS, BS, ASTM, DIN, SAE, AISI, ISO   (5)

2. Casting processes

   - Importance of casting as manufacturing Process, advantages and disadvantages of
     casting processes, foundry layouts and mechanization

   - General introduction to patterns, core boxes and gating systems-.

   - Types of patterns and cores and core boxes, materials used and selection criteria for pattern making, pattern allowances.

   - Components of gating system, functions and importance of runners and risers, solidification control devices: chills, ceramics bricks, directional solidification   (5)

3... Introduction to principals of moulding and core making processes:

   - Types of moulding and core making sands and their properties, Green sand, shell sand CO_2 sand, oil sand, Cold box process. Investment casting. Moulding machines and core making machines.   (3)

   - Introduction to permanent mould casting process
     -Gravity and pressure die-casting
     -Centrifugal casting
     -Continuous casting   (2)

4. Melting and pouring

- Types of fuel fired melting furnaces
  -Cupola furnace, oil/gas fired furnaces, crucible furnaces
  -Melting practice on different furnaces
  -Metallurgical control in furnaces
  -Metal pouring equipments   (3)

5. Cleaning-fettling and inspection of casting,   (2)

SECTION- II

6. Introduction to forming processes

- Rolling,   (3)

- Forging,   (3)

- Extrusion,   (2)

- Wire, rod and pipe drawing.   (2)

7. Introduction to joining processes

- Welding processes: Arc, TIG, MIG and Resistance welding   (3)

- Brazing and Soldering   (2)

- Joining of polymeric materials   (1)

8. Shaping of plastics.

- Introduction to blow molding, injection molding, extrusion, calendaring and thermo forming   (4)

The Workshop practice III should cover the practical based on this syllabus, the load of which shall be allotted to teaching staff.

Term work

1. Sand testing for given sand and core sand
   a)   Size analysis. Grain fineness Number
   b)   Hardness (mould/core)
   c)   Permeability
   d)   Moisture percentage
   e)   Clay content
   f)   Given Compressive strength
2. Green Sand moulding
3. Study of types of patterns and core boxes.
4. Study of melting furnaces
5. Study of casting defects
6. Study of welding defects.
7. Melting and pouring practices.

8. Industrial visit to a foundry.

9. Industrial visit to study the processes like rolling, drawing, welding and forging

Note: The practicals which are not possible to be conducted in house may be demonstrated during industrial visits.

TEXTBOOKS

1. V D Kodgire, Material science and metallurgy. Everest Publishers, Puns
2. Swroop and Saxena, Elements of metallurgy, Rastogi Publications, Meerut.
3. P L Jain, Principles of foundry technology-, Tata McGraw-Hill, New Delhi.
4. O. P. Khanna, Foundry technology, Khanna Publishers, New Delhi.
5. P. C. Sharma., Production technology, S. Chand and Company Ltd.,
6. O. P. Khanna. Welding technology, Khanna Publishers, New Delhi.
7. Vijendra Singh, Material science, Standard Publication, standard Publishers,
8. Work shop practice I – by Hajra Chowdhary.
9. Manufacturing Processes for Engg. Materials -S..Klpakjim, S.R. Schmid Perason Education
10 Fundamentals Of Modern Manufacturing M.P.Groover Wiley India Pvt. Ltd.

REFERANCE BOOKS

1. R A Higgins. Engineering Metallurgy-P ART I /II, Tata McGraw-Hill Book Company, New Delhi.
2. Haine And Rosenthal, Principles of metal casting, Tata McGraw-Hill Book Company. New Delhi.
3. Little, Welding technology, Tata McGraw-Hill Book Company. New Delhi.
4. ASTM Volumes on Welding, casting, forming and material selection
5. Manufacturing Processes And System 9E P. Ostwald, J. Munoz, John Wiley & Sons (asia)
   Pvt.Ltd.

6. FLUID MECHANICS

Teaching Scheme: Examination Scheme:
Lectures: 3 hrs/week   Theory Paper : 100 marks (3 hrs. duration)
Practical: 2 hrs/week   Term work   : 25 marks
                                     Practical and Oral . 25 marks

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SECTION-I

1. Introduction: (3)

   Definition of fluid, properties of fluid, fluid as a continuum, Pascal's law, hydrostatic law of pressure, Viscosity, types of fluid, compressibility, surface tension, capillarity and vapor pressure.

2. Kinematics Of Fluid Flow   (4)

   Flow visualization, types of flow, streamline, path line, streak line, stream tube, continuity equation in Cartesian coordinates in three dimensional form. Velocity and Acceleration of fluid particles, stream function and velocity potential function

3. Dynamics Of Fluid Flow   (6)

   Equation of motion. Integration of Euler's equation as energy equation. Energy correction factor
   Steady and unsteady flow through orifice. Orificemeter, time required to empty the tank, Venturimeter, flow over triangular and rectangular notches.
                                        ;
4. Momentum Equation   (3)

   Derivation of momentum equation, momentum correction factor. Applications of momentum equation.

5. Dimensional Analysis and Similitude   (4)

   Dimensionally homogeneous equations, Buckingham's TT theorem, calculation of dimensionless parameters. Similitude, complete similarity, model scales.

SECTION – II

6. Laminar Flow (3)

Laminar flow through circular pipes. Laminar flow through parallel plates, Navier Stoke's equation and its applications, introduction to CFD.

7. Pipe Flow (6)

Energy losses in transition, expansion and contraction (Darcy's and Chezy's equation),. Parallel pipe, siphon pipes, branching pipes and equivalent pipes.

8. Boundary Layer Theory (3)

Boundary layer thickness, its characteristics, laminar and turbulent boundary layers, separation, boundary layer control (descriptive treatment)

9 Forces on immersed bodies (3)

Types of drags on a flat plate. Drag on aerofoil. Development of lift. (Magnus effect) stalling condition of aerofoil.

10. Compressible flow (5)

Propagation of elastic waves, Mach number cone. Energy equation of compressible flows. Stagnation pressure and temperature, Adiabatic flow through pipes of varying cross section, Isentropic flow, Condition of maximum discharge.

TERM WORK

Experiments must be set simultaneously and the number of students in each group working on a set up shall not exceed 5 students.The term work shall consist of the report on any ten experiments from the following:

1. Flow visualization by plotting of streamline (Heleshaw apparatus).
2. Reynolds experiment.
3. Verification of Bernoulli's equation.
4. Calibration of venturimeter .
5. Calibration of orifice-meter.
6. Calibration of notches.
7. Orifice under steady and unsteady flow condition
8. Determination of velocity profile through circular pipes for laminar flow.
9. Determination of minor losses in pips-fittings
10. Determination of loss head and discharge in parallel pipe.
11. Determination of loss of friction in series pipes.
12. Demonstration or trial on wind tunnel for measurement of lift and drag on any model.
13. Pressure and velocity distribution over aerofoil.

Instructions for practical examination

1. Four to five experiments shall be selected for practical examination.
2. The number of students for each practical set up would not be more than four students.
3. Oral will be based on the practical performed in the examination and the experiments included in the journal.

BOOKS

1. V. L. Streeter and E. B. Wyline, Fluid Mechanics, Wiley Eastel Limited, New Delhi
2. K. L. Kumar, Fluid Mechanics, S. Chand Publication. New Delhi
3. K. Subramanya, Theory and Applications of machines, Tata McGraw Hill Publication.
4. Fox and McDonald, Fluid Mechanics, John Wiky and Sons, New York.
5. Bansal. Fluid Mechanics , Laxmi publications. New Delhi.
6. Fraizini, Fluid Mechanics. 4/e. Tata McGraw-Hill, New Delhi.
7. White, Fluid Mechanics, 4/e, Tata McGraw-Hill, New Delhi.
8. Rammamrutham,
9. Modi and Seth, 'Fluid mechanics and Hydraulic machines',
10. R. K Rajput, 'Fluid mechanics and Hydraulic machinenary', Laxmi publishers
11. Fluid Mechanics By J.F.Douglas, J.M.Gasiorek J.A.Swaffied 4e pearson education
12 Fluid Mechanics –Fundamentals & Application Y.A.Cengel,J.M.Cimbala Adopted by S.C. Bhattacharya TMI
13 Fundamentals Of Fluid Mechanics, B.R. Munson,D.F. Young, T.H.Okiishi 5e Wiley India Pvt.Ltd.

S.E. (MECH)(REVISED) PART-I

7. WORKSHOP PRACTICE-III

Teaching Scheme   Practical:- 2 hrs/week   Term Work:-   25 marks

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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. Preparation of pattern from component drawing,   Pattern manufacturing   after preparing pattern drawing.

2. Study of different types of forging processes and one job based on smithy/ forging.

3. Study of different types of welding processes and one job based on any one welding method.

1.ANALYSIS OF MECHANICAL ELEMENTS

Teaching Scheme: Examination Scheme:
Lectures: 3 hrs/week   Theory Paper: 100 marks (3 hrs. duration)
Practical: 2 hrs/week   Term work   : 25 Marks
(Alternate week)

SECTION-I

1. Stresses and Strain.   (7)

Concept of stress and strain, (Linear, lateral, shear and volumetric), Hooke's Law, Poisson's ratio, Modulus of Elasticity, Modulus of rigidity', stress-strain diagram for ductile and brittle material factor of safety, working stress. Normal and shear stresses, Thermal Stresses. Complementary shear stress, Bulk Modulus, Inter-relationship between elastic constants.

2. Torsion   (3)

Basic assumptions. Torsion formula. Hollow and solid circular shafts, Angular deflection

3. Shear Force and Bending Moment Diagram.   (4)

Concept and definition of shear force and bending moment in determinate beams due to concentrated, UDL and uniformly varying load

4. Stresses in Beams   (7)

I) Bending stresses -
Symmetric pure bending of beams, flexure formula, moment of resistance of cross-sections, simple built-up section, design of rectangular and circular (solid and hollow) sections; L, I and T sections
II) Shear stresses -
Distribution of shear stresses in beams of various commonly used sections such as circular. I, T, and angles

SECTION II

5. Principal Stresses and Strains   (8)

Normal and shear stresses on any oblique planes, concept of Principal planes, derivation of expression for Principal stresses and maximum shear stress, Positions of principal planes and planes of maximum shear, Graphical solutions using Mohr's circle of stresses, Combined effect of shear and bending in Beam, Theories of elastic failure (Without derivation).

6. Deflection of Beams (4)

Strain curvature and moment curvature relation, solution of beam deflection problem by Double integration method, Area moment method. (Simply Supported Beam & Cantilever.)

7. Columns (3)

Euler's formula for different end connections, concept of equivalent length, eccentric loading, Rankine formula

8. Energy Methods (4)

Strain energy for uniaxial stress, Pure bending (Simply Supported Beam & Cantilever.), Shear stresses (Direct Shear & Pure Torsional), Use of energy theorem to determine deflections and twists of shafts

TERM WORK

A term work shall consist of report on the assignments given below.

1. Shear force and bending moment diagram.

2. Bending and shear stresses in beams.

3. Principal stresses and theories of failures.

4. Torsion.

5. Deflection of beams.

6. Columns.

TEXTBOOKS

1. Ferdinand P Beer and E.R. Johnston JR. John Dewolf, Mechanics of Materials 3/e, McGraw Hill Book Company
2. Timoshenko and Young. Elements of Strength of Materials, East-West Press. Pvt. Limited, New Delhi.
3. Ramamurthum, Strength of Materials, Dhanpat Rai and Sons, New Delhi.
4. Rajput, Strength of Materials, Laxmi Publication

5. S.B Junnerkar. Mechanics of structure Vol I, Publication House

6. Bansal, Charotor Strength of Materials, Laxmi Publication

7. Khurmi Gupta, Strength of Materials, S. Chand Publication.

8. E.P.Popov "Mechanics of Materials" Prentice Hall Inc.

9. Andrew P. & Singer F.L., "Strength Of Materials", Harper & Row Publishers

10. G.H. Rider. "Strength of Materials ", Mac Millan India Ltd.

11 Mechanics of Materials Hibbler 2e Pearson Education Publication

REFERENCE BOOKS

1. Den Hartong, Strength of Materials, McGraw Hill, New York.

2. H. BURR and John Cheatam, Mechanical Analysis and Design, PHI, New Delhi.

3. Robert Norton, Machine Design, Prentice Hall

4. Schaum Outline Series, "Strength Of Materials", Mc Graw Hill Publishers.
5 Strength of materials B.K.Sarkar Mc Graw Hill Publishers
6 Strength of materials L.S.Negi Mc Graw Hill Publishers

S.E. (MECH)(REVISED) PART-II
2.NUMERICAL METHODS

Teaching Scheme	Examination Scheme
Lecturers: **3 Hrs/ Week**	Theory :-**100 Marks(3Hrs Duration)**
Practicals: **2 Hrs/ Week**	Term work: **25 Marks**

The Theory paper shall contain only the numericals based on syllabus. More emphasis should be given on solving actual mechanical engineering problems by using numerical methods. No computer program should be asked in theory examination.

Section - I

1) Roots of equation: (5)

   a) Bracketing Methods - Bisection Methods, False Position Method

   b) Open Methods - Newton Rapson, Multiple Roots, System of non-linear Equations, Secant Method

   c) Roots of polynomials -Muller's Method

2) Linear Algebraic equation: (5)

   a) Gauss Elimination Method - Naive Gauss Elimination, Pitfalls of Elimination Methods, Techniques of improving solutions, Gauss-Jordan Method

   b) Matrix Inversion - LU Decomposition, Matrix Inverse, Gauss Seidel, Jacobi Iteration Method

3) Curve Fitting: (5)

   a) Least Square Regression - Linear Regression, Polynomial Regression.

   b) Interpolation - Newton's divided difference, Interpolating Polynomial Lagrange's interpolating polynomial,

4) Statistics :   (5)

   Mean and standard deviation. Addition and multiplication laws of probabilities. Binomial, Poisson and normal distribution

Section - II

5) Numerical Differential & Integration: (4)

   a) Newton's Cote's Integration of Equation - Trapezoidal rule, Simpson's rules, Integration Unequal Segments.

   b) Integration of equations - Romberg's Integration & Gauss quadrature.

   c) Numerical Differentiation. - Differentiation formulae, Richardson Extrapolation, Derivation of unequally spaced data., Forward difference, Central difference, Backward difference

6) Ordinary Differential Equation: (5)

   a) Taylor's Series method, Picard method, Runge-Kutta methods, Euler's method, Improved Polygon Method, System of Equations. ,

   b) Boundary Value & Eigen Value Problem, shooting Method, Finite Difference Method, Eigen Value Problem based on Polynomial Method, Power Method.

7) Partial Differential Equation: (6)

   a) Finite difference - Elliptical Equations, Laplace's equation Liebmen Method, Secondary Variables, Boundary condition

   b) Finite difference - Parabolic Equations, Explicit Method Implicit Method, Crank Nicolson Method

8) Introduction to Finite Element Method :- Solutions to boundry value problems, (5) integral formulations for numerical solutions, One dimensional linear element, Applications of FEM in 1D and 2D conduction and convection heat transfer problems.

Term Work:

1) Eight Assignments based on above six topics. The students are expected to solve the given problem by using the appropriate programs given to them.

Reference Books:

1) Numerical method for Engineers - S.C. Chapra, Canale (Tata McGraw Hill Publications)

2) Numerical Methods – Dr. B.S. Grewal (Khanna Publications)

3) Numerical methods – E Balguruswamy (Tata McGraw Hill Publications)

4) Numerical Heat transfer and Fluid flow - S.U. Patankar (McGraw Hill Publications)

5) Applied Finite Element Analysis – Larry J. Segerlind (John Wiley & Sons)

6) Introductory Methods of Numerical Analysis- S.S.Sastry (Prentice Hall Publication)

S.E. (MECH.)(REVISED)PART-II
3. METALLURGY

Teaching Scheme:
Lectures: 3 hrs/week
Practical: 2 hrs/week

Examination Scheme:
Theory Paper: 100 marks (3 hrs. duration)
Term work : 25 Marks
Oral: 25 marks

SECTION-I

1. Metals and Alloy Systems: (6)

   a) Metals, metallic bonds, crystal structure (BCC, FCC, HCP only), imperfection in crystals

   b) Alloy formation by crystallization, nucleation, solidification and growth, cooling curves,

   c) Solid solutions and intermediate phases
   d) Phases and phase rule
   e) Construction of equilibrium diagrams from cooling curves, components of different solubility in liquid and solid state, Eutectic, Eutectoid, Peritectic transformations. Lever arm principles, Long and short-range freezing, dendritic structure and coring.

2. Study of phase diagrams with respect to typical compositions, properties and applications for the following alloys. (10)

   • Ferrous alloys (Plain carbon steels, cast iron and alloy steels- Free cutting steels, HSLA high carbon low alloy steels, maraging steels. creep resisting steels, Stainless steels-different types.
   • Cu- Sn, Cu- Zn, Cu- Be-Copper alloys
   • Al-Si, Al- Cu - Aluminum alloys
   • Pb-Sn, Sn-Sb - Other alloys.
   • Mg alloys, Ti alloys and Ni based alloys.
   • Miscellaneous alloys such as super alloys, heating element alloys. study of low expansion and controlled expansion alloys

3. Principles of Metallurgical Testing   (4)

   a) Destructive Testing methods;
      Tensile, Compressive, Impact, Fatigue, Creep, Hardness etc.

   b) Non- Destructive Testing: -
      Dye penetrant, magnetic, ultrasonic, Radiography, Eddy Current testing.

SECTION II

5. Principles of Heat Treatment Processes of Steels   (4)

   a) Transformation of Pearlite into austenite upon heating,

   b) Transformation of austenite into Pearlite, Bainite and Martensite on cooling.
   c) TTT –Diagram and CCT - Diagrams - significance, Effect of alloying dements on
      TTT diagram and its significance.
                                                    ,

6. Heat Treatment Processes   (7)

   a) Softening processes :

   - Annealing – Full (Spherodising, solution treatment)

   - Partial and

   - Sub critical annealing (Stress relief, process and recrystallization
     annealing)

   b) Toughening treatments

   - Normalising

   - Hardening (Hardening types) and tempering (Types, Structural
     transformations during tempering)

   - Austempering and martempering

   - Ageing and sub zero treatment

   c) Hardening - Surface hardening - Flame and induction

        -Case hardening - Carburising, nitriding, cyniding, carbonitriding

   e) Precipitation hardening - basic requirements, stages, common alloys, variables,

                                theories

7. Heat treatment furnaces and equipments, controlled atmospheres   (4)

   Heat treatment defects and remedies. Mechanism of quenching and Quenching Baths.

8) Powder Metallurgy of metals, non-metals and composites with respect to flow charts

                                                                                           (3)

Stage - Powder manufacturing types
- Mixing/ Blending
- Compaction- types
- Sintering
- Sizing/ impregnation

Flowcharts for - Tool materials, bearings and bashes, electrical contacts, magnets, sintered aluminum products,

9) Metallurgy of Manufacturing processes (casting, welding and forming)   (2)

TERM-WORK

1) Tensile testing of mild steel. Cast iron, Brass and aluminum.

2) Hardness testing (Rockwell and Brinell) of steel, CI, Brass, and alloy steel.

3) Impact testing: Mild steel, Brass, C.I, Aluminum

4) Demonstration of N.D.T. (Any two of different NDT tests)

5) Macroscopic Examinations such as spark test Sulphur printing.

6) Examination of microstructure of steels.

7) Examination of microstructure of C.I.

8) Examination of microstructure of Non ferrous alloys.

9) Jominy end - quench test for hardenability

10) Observation of various industrial heat treatments processes during industrial visits.

Note: The practicals which are not possible to be conducted in house may be demonstrated during industrial visits.

BOOKS

1. Vijendra Singh. Engg. Physical Metallurgy, Standard Publishers, Delhi

2. V.D. Kodgire, Material science and metallurgy, Everest Publishers Pune

3. S.H.Avner, Physical Metallurgy, TMH publication.

4. Clerk, Verney, Engineering Metallurgy' -.

5. Higgins R. A., Hodder, Engineering Metallurgy I and II, English language Book Society.

6. A.K. Sinha, Powder Metallurgy

7. Rollson , Metallurgy for Engg. Technicians, English language Book Society

8. T.V. Rajan / C.P. Sharma, Heat Treatments Principles and Practices, Prentice Hall of India Pvt Ltd,, New Delhi.

9. Prabhudev, Heat treatment of Steels, HMT Handbook

10. G.E. Dieter, Mechanical Metallurgy, Tata McGraw-Hill, New Delhi.
11. Material science and Metallurgy, C. Daniel Yesudin,D.G.Harris Samuel Scitech Publication (I) Ltd
12 Material Science And Engineering Callister Wiley India Edition
13 Manufacturing Processes And System 9E P. Ostwald, J. Munoz, John Wiley & Sons (asia) Pvt.Ltd.

S.E. (MECH)(REVISED) PART-II
4. MACHINE TOOLS

Teaching Scheme-.   Examination Scheme :

Lectures: 3 hrs/week   Theory Paper : 100 marks (3 hrs. duration)

SECTION-I

1. Introduction to metal cutting and machine tools   (3)

 Metal cutting principle, orthogonal and oblique cutting, machine tool - definition and purpose, characteristics, classification, elements, cutting motions (primary and feed).

2. Lathe   (6)

Working principles, types specifications, principal parts, accessories and attachments, various lathe operations, introduction to automats.

3. Capstan and Turret Lathes   (3)

Principle parts, working, comparison with centre lathe, turret indexing mechanism, bar feeding mechanism, turret tool holders.

4. Drilling Machine   (2)

Classification of drilling machines, construction and working of radial drilling machine, various accessories, various operations.

5. Boring Machine (2)

Horizontal and vertical boring machine, construction and operation, boring tools and bars. Introduction to Jig boring-machine.

6. Shaping Machine (2)

Types-crank shaper, hydraulic shaper, Crank and slotted link quick return mechanism. Table feed mechanism, various operations.

7. Planning Machine (2)

Types-standard double housing planer, principle parts, table drive and feed mechanism, various operations.

SECTION-II

8. Milling Machine (6)

Classification of milling machines, construction and working of column and knee type milling machines, milling operations, study of standard accessories- dividing head, rotary table, gear cutting on milling machine, vertical milling attachment for horizontal milling machine.

9. Grinding Machine (5)

Classification - cylindrical (external/internal), centerless, surface grinder, tool and cutter grinder, gear grinding, Grinding wheels- Abrasives, bonds and bonding processes, grit, grade and structure of wheel, wheel shapes, wheel specifications.
Selection, mounting, glazing, loading, truing, wheel balancing (Introduction only).

10. Broaching Machine (2)
Classification of broaching machines, various operations, advantages and limitations.

11. Gear Manufacturing Processes (4)
Study of various processes like gear shaping, gear hobbing. Gear finishing processes -gear shaving, gear burnishing and gear rolling.

12. Introduction to CNC machines (3)

Construction and working of CNC machine tools, types of CNC machines, introduction to CNC tooling.

Note: **The Workshop practice IV should cover the practical based on this syllabus, the load of which shall be allotted to teaching staff.**

BOOKS

1) W. A. J. Chapman,. Workshop Technology vol. I, II, III, CBS Distributor New Delhi.

2) Raghuvansrii, Workshop Technology vol. II, Dhanpat Rai and Sons.

3) Gupta/Kaushik, Workshop Technology vol.. New Heights, Delhi.

4) Hajra Choudhary, Workshop Technology vol. II, Media promoters and Publications

5) P. C. Sharma, Production Technology, S. Chard publication.

6) Dalela, Manufacturing Science and Technology vol. II

7) R. K. Jain, Production technology, Khanna Publications.

8) Kundra, Rao, Tiwari, Computer Aided Manufacturing,

9) Manufacturing Processes And System 9E P. Ostwald, J. Munoz, John Wiley & Sons (asia) Pvt.Ltd.

S.E. (MECH)(REVISED) PART-II

5. THEORY OF MACHINES-I

Teaching Scheme: Examination Scheme;
Lectures: 3 hrs/week   Theory Paper: 100 marks (4 hrs. duration)
Practical: 2 hrs/ Alternate week   Term work   : 25 Marks

SECTION-I

1. Basic Concept of Mechanisms: (3)

   Links, kinematic pair (lower and higher), kinematic chain, mechanism, inversion,types of constraints, Grubbler's criterion, slider crank chain and its inversions, double slider crank chain and its inversions, four bar chain and its inversions.

2. Velocity and Acceleration in Mechanisms: (7)

   Velocity and acceleration diagram for different mechanisms using relative velocity and acceleration method, Coriolis' component of acceleration, Klein's construction for slider crank mechanism, velocity analysis by Instantaneous center method for four bar chain and slider crank chain.

3. Mechanisms with Lower Pairs: (5)

   Pantograph, exact straight-line mechanisms- Paucellier and Hart Mechanism, Approximate straight line mechanism Tchebicheff and Grass-Hopper Mechanism, steering gear mechanisms, Hooke's joint.

4. Kinetic analysis of Mechanisms:

   Velocity and acceleration of slider crank mechanism by analytical method, Inertia force and torque, D'Alembert's principle, Dynamically equivalent system, force analysis of reciprocating engine mechanism.   (5)

SECTION-II

5. Synthesis Of Mechanism: (3)
   Chebychev method to find precision points for four bar mechanism and slider crank mechanism ,Freudeinstein's Equation.

6. Cams: (5)

   Types of cams and followers, profiles of cams for specified motion of different followers, spring load on the follower, jumping of follower.

7. Friction: (4)

   Friction circle, friction in pivot bearings, friction in screws.

8. Governors: (4)

   Types of governors. Porter and Hartnell governor, controlling force and stability of governor, hunting, sensitivity, isochronism, governor effort and power, Insensitiveness of governors.

9. Belts , Ropes and Dynamometers: (4)

Types of belt and rope drives, calculation of length and power transmitted, belt tension ratio, actual tension in a running belt, centrifugal and initial tension in belt, slip and creep of belt, classification of dynamometers, study of rope brake absorption dynamometer and belt transmission dynamometer.

TERM WORK

A term work shall consist of report on any six of the following.

1) One A3 size sheet of Velocity and acceleration problems by relative velocity and acceleration method.

2) One A3 size sheet of problems on Instantaneous center method and Klein's construction.

3) Verification of ratio of angular velocities of shafts connected by Hooks joint.

4) Determination of M.I. by Bifilar suspension, Trifilar suspension, compound pendulum.

5) Synthesis of mechanism –Two position for slider crank and Three position for four bar Mechanism

6) One A3 size sheet of Problems on cam profile. (Minimum four problems)

7) Governor characteristics for Porter or Hartnell governor.

TEXT BOOKS

1) Ratan S.S, Theory of Machines,2e Tata McGraw Hill New Delhi.

2) P.L.Ballany, Theory of Machines, Khanna Publication, New Delhi.

3) V.P. Singh, Theory of Machines, Dhanpat Rai and Sons.

4) Phakatkar, Theory of Machines I and II, Nirali Publication. Pune

5) Dr. R.K.Bansal, Theory of machines, Laxmi Publication.

REFERENCE BOOKS

1) Thomas Bevan, Theory of Machines, CBS Publishers, New Delhi.
2) Shigley, Theory of Machines and Mechanism, McGraw Hill, New York
3) G.S. Rao and R.V. Dukipatti, Theory of Machines and Mechanism, "New Age Int. Publications Ltd. New Delhi.
4) Shah and Jadhawani, Theory of Machines, Dhanpat Rai & Sons
5) Abdullah Shariff, Theory of Machines, McGraw Hill, New Delhi.

6) Kinematics Dynamics And Design Of Machinery
KennethJ.Waldron/GaryL.Kinzel Wiley Student
        Edition Wiley sons (asia)Pvt Ltd.

S.E (MECH)(REVISED) PART-II
6. FLUID & TURBO MACHINERY

Lectures :3 Hrs. per Week   Theory Paper :100 Marks (3 HRS Duration)

Practical : 2 Hrs   Term Work : 25 Marks

Oral : 25 Marks

SECTION-I

1. Impulse Water Turbines :
Euler's equation for work done in Rotodynamic Machines classification of water turbines,Pelton wheel, its construction and working, velocity triangles. Types , Pelton wheel design bucket dimensions, number of buckets, jet diameter, wheel diameter, jet ratio, speed ratio, number of jets, calculation of efficiency, power, discharge etc. Governing of Pelton wheel.   (06)

2. Reaction Water Turbines :
Principle of operation, construction and working of Francis and Kaplan Turbine, effect of modification of velocity triangles on runner shape, draft tube, cavitation calculation of various efficiencies, power, discharge, blade angles, runner dimensions etc. Governing of Francis and Kaplan turbine. Draft tube-types and analysis.   (06)

3. Centrifugal Pumps:
Working principles, Construction, types ,various heads, multistage pumps, velocity triangles,minimum starting speed, cavitation, MPSH and NPSH. Methods of priming calculations of efficiencies, discharge, blade angles, head, power required, impeller dimensions etc.   (05)

4. Similarity Principles :
Model testing, unit quantities, Specific speed of turbine (Pelton wheel, Francis turbine, Kaplan turbine), specific speed of pumps. Prediction of performance at other operating conditions. Performance characteristics of Turbines and pumps.   (03)

SECTION-II

5. Air compressors:
Application of compressed air , classification of compressor, reciprocating compressors, construction , work input, necessity of cooling , isothermal efficiency, heat rejected, effect ofclearance volume, volumetric efficiency, necessity of multistaging, construction, optimum intermediate pressure for minimum work required, after cooler, free air delivered, air flow measurement, capacity control. Roots blower and vane blower (descriptive treatment)   (08)

6. Rotodyanamic Air Compressors:
Centrifugal compressor, velocity diagram. Theory of operation, losses, Adiabatic efficiency, effect of compressibility, diffuser, prewhirl, pressure coefficient, slip factor, performance.Axial flow compressors, velocity diagram, degree of reaction, polytropic efficiency, surging, chocking, stalling, performance, comparison with centrifugal. (07)

7. Gas turbines:
Working principles, applications, open, closed cycle and their comparison. Cycle modified to regeneration, reheat, inter cooling performance. Calculation of gas turbine work ratio, efficiency etc. (05)

TERM WORK
Any Seven experimentsfrom 1 to 8.
1. Study and trial on Pelton wheel.
2. Study and trial on Francis/ Kaplan turbine
3. Trial on Centrifugal pump
4. Study and demonstration of reciprocating pump and hydraulic ram
5. Study and trial on reciprocating compressor
6. Study and trial on centrifugal blower
7. Study of hydraulic devices- Intensifier, Accumulator, Hydraulic jacks, press, Crane.
8. Study of other types of pumps- Gear pump, Jet pump, submersible pump, air lift pump
9. Industrial visit or hydro power plant visit

REFERENCES:

1. Hydraulic Machines by V.P. Vasantdani
2. Fluid flow machines by N.S. Govindrao
3. Turbo machines by S.M. Yahya
4. Fluid power Engineering by D.S. Kumar
5. Steam & gas Turbines by R. Yadav
6. Steam & gas Turbines by V. Ganeshan
7. Thermal Engg. by Kumar vasantdani
8. Thermal Engg. By P.L. Balleny
9. Gas turbines & Compressor by Cohen & Rogers
10. Thermodynamics & Heat Engines – Vol-II by R. Yadav
11.Fluid mechanics and hydraulic machines by Modi and Seth
12. Thermal Engineering by R K Rajput

13 Fluid Mechanics & Hydraulic Machines S.C. Gupta 1e Pearson Education

S.E. (MECH)(REVISED)PART-II

7. COMPUTER AIDED DRAFTING

Teaching Scheme: Examination Scheme:

Practical: 2 hrs/week   Term Work: 25 Marks

                                             Practical and Oral: 25 Marks

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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 linetype, 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.

TERM 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.

BOOKS

1. George Omura, Mastering Auto CAD, BPB Publication.

2. George Omura, ABC's of Auto CAD, BPB Publication.

3. Bethune, Engineering graphic with Auto CAD 2002,2004 Pearson Publication.

4. Various advance 3d modelling software manuals.

5 M/c Drawing with AutoCad By Gautam Purohit Gautam Ghosh by Pearson ! st Print

6. Machine Drawing Ajeet Singh The Tata McGraw-Hill 2e

S.E. (MECH) (REVISED) PART-II

8. WORKSHOP PRACTICE -IV

Teaching Scheme: Practical: 2 hrs/week

Term Work : 25 Marks

       The load of workshop practice IV 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 fuming, 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 centerless).

    d. Study and demonstration of shaper/planer (mechanisms and stroke).

4) Industrial visit to study gear manufacturing processes and finishing 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 journal carry remaining 10 marks.]

EQUVALANCE FOR SE MECH PART-I OLD

WITH S.E.(MECH) PARTI&PART II FROM 2008-2009

LECTURE SCHEME FOR EACH SUBJECT

SHIVAJI UNIVERSITY, KOLHAPUR

I (Revised)

Sr.No.	S.E. (Mechanical/ Automobile) Part-I old course Subjects	Equivalent Subject in new course	Remarks
1	**Electrical Technology & Electronics**	***Electrical Technology And Computer Programming C++**	
2	**Computer Programming C , C++**	**Computer Programming C , C++**	**This subject is now taught at FE part-I, so if any candidate is not yet passed the paper is required to be made available**
3	**Materials & manufacturing Processes**	**Manufacturing Processes**	
4	**Applied Thermodynamics**	**Applied Thermodynamics**	
5	**Fluid Mechanics**	**Fluid Mechanics**	
6	**Machine Drawing –I**	**Machine drawing @**	
7	**Workshop Practice –III**	**Workshop Practice –III**	

NOTE: Two / four more chances would be given to the students appearing to the SE (Mech) Part-I &II may 2008 examination.

EQUVALANCE FOR SE MECH PART-II OLD

WITH S.E.(MECH) PARTI&PART II FROM 2008-2009

LECTURE SCHEME FOR EACH SUBJECT

Sr.No.	S. E. (Mechanical/ Automobile) Part-II old course Subjects	Equivalent Subject in new course	Remarks
1	Engg. Maths.-III	Engg. Maths.-III at SE Mech Part-I	
2	Programming & Computational Methods	Numerical Methods	
3	Theory of Machines- I	Theory of Machines- I	
4	Analysis of mechanical Elements	Analysis of mechanical Elements	
5	Metallurgy	Metallurgy	
6	Machine Tools	Machine Tools	
7	Machine drawing- II	Computer Aided Drafting	
8	Workshop Practice –IV	Workshop Practice –IV	
9	General Proficiency-I	---------	

NOTE: Two / four more chances would be given to the students appearing to the SE (Mech) Part-I &II may 2008 examination.