DEPARTMENT OF TECHNOLOGY
SECOND YEAR B.TECH
Scheme of Teaching and Examination
Semester – III (Mechanical Engineering)

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credits	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
1.	Numerical Methods	04	01	-	05	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
2.	Electrical Technology and Computer Programming C++	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
3.	Engineering Thermodynamics	03	-	-	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
4.	Manufacturing Engineering. – I	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
5.	Fluid Mechanics	03	-	-	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
6.	Power Lab.	-	-	02	01	------	-------	--------	IPE	50	20
						------	-------	-------	EPE	50	20
7.	Electrical Technology and Computer Programming C++	-	-	02	01	------	-------	--------	IOE	50	20
8.	Machine Drawing	01	-	02	02	------	-------	--------	EPE	50	20
9.	Fluid Mechanics Lab	-	-	02	01	------	-------	--------	IPE	50	20
10	Workshop Practice - I			02	01				IPE	50	20
	Total	**19**	**01**	**10**	**25**	------	**500**	--------	--------	**300**	--------

11.	Environmental Studies	2	-	-	02	Project Theory	30 70	40	--------	-------	--------

Total Credits: 25
Total Contact Hours/Week: 30 hrs
Note:
#: Minimum 40% marks must be secured in SEE to pass that head.

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DEPARTMENT OF TECHNOLOGY
SECOND YEAR B.TECH
Scheme of Teaching and Examination
Semester – IV (Mechanical Engineering)

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credits	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
1.	Applied Mathematics	04	01	-	05	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
2.	Mechanics of Material	03	01	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
3.	Theory of Machine - I	04	01	-	05	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
4.	Fluid and Turbo Machinery	03	-	-	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
5.	Material Science and Metallurgy	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
6.	Fluid and Turbo machinery Lab.	-	-	02	01	-------	-------	--------	IPE	50	20
						-------	-------	--------	EPE	50	20
7.	Material Science and Metallurgy Lab.	-	-	02	01	-------	-------	--------	IPE	50	20
						-------	-------	--------	EOE	50	20
8.	Workshop Practice - II	-	-	02	01	-------	-------	--------	------	------	------
						-------	-------	--------	EPE	50	20
9.	Theory of Machine – I Lab.	-	-	02	01	----	-----	-------	EOE	50	20
	Total	**18**	**03**	**08**	**25**	-------	**500**	--------	--------	**300**	--------

HS222	Environmental Studies	2	-	-	-	Project	30	40	**--------**	**-------**	**--------**
						Theory	70				
Audit Course I											
HS211	Introduction to Foreign Language	-	-	02	-----	Institute Level	-----	-------	-------	------	-------

Total Credits: 25
Total Contact Hours/Week: 29 hrs
Note: #: Minimum 40% marks must be secured in SEE to pass that head.
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DEPARTMENT OF TECHNOLOGY
THIRD YEAR B.TECH
Scheme of Teaching and Examination
Semester – V (Mechanical Engineering)

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credits	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	------ --	-------	--------	-------	--------	-------
7.	CAD – Lab - I	-	-	02	01	------ --	-------	--------	IOE	-	-
						------ --	-------	--------	EPE	50	20
8.	Workshop Practice - III	-	-	02	01	------ --	-------	--------	IOE	50	20
9.	Heat and Mass Transfer	-	-	02	01	------ --	-------	--------	IPE	50	20
						------ --	-------	--------	EPE	50	20
10.	Seminar	-	-	04	02	------ --	-------	--------	IOE (Based on seminar)	50	20
11.	Manufacturing Engg II Lab.	-	-	02	01	------ --	--------	--------	IPE	-	-
						------ --	--------	--------	EPE	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:

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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
Semester – VI (Mechanical Engineering)

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credits	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	-	-	02	01	--------	-------	--------	IOE	50	20
7.	Internal Combustion Engines	-	-	02	01	--------	-------	--------	IPE	--	--
						--------	-------	--------	EPE	50	20
8.	CAM Lab.	-	-	02	01	--------	-------	--------	IOE	--	--
						--------	-------	--------	EPE	50	20
9.	Machine Design - II	-	-	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:

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IOE– Internal Oral Evaluation, EOE–External Oral Examination

DEPARTMENT OF TECHNOLOGY
FINAL YEAR B.TECH
Scheme of Teaching and Examination
Semester – VII (Mechanical Engineering)

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credits	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
1.	Refrigeration and Air-conditioning	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
2.	Hydraulics and Pneumatics	03	-	-	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
3.	Machine Design – III	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
4.	Manufacturing Engg. - III	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
5.	Elective – I	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
6.	Refrigeration and Air-conditioning	-	-	02	01	--------	-------	--------	IPE	50	20
		-	-			--------	-------	--------	EOE	50	20
7.	Manufacturing Engg. - III	-	-	02	01	--------	-------	--------	IPE	--	--
		-	-			--------	-------	--------	EOE	50	20
8.	Major Project(Phase I)	-	-	02	01	--------	-------	--------	IOE (Project Based Seminar)	50	20
9.	Entrepreneurial Skill Development	01	---	02	02	--------	-------	--------	IOE Seminar)	50	20
10.	Report of Industrial Training	-	-	-	-	--------	-------	--------	IOE	50	20
	Total	**20**	**--**	**08**	**24**	--------	**500**	--------	--------	**300**	--------

Total Credits: 25
Total Contact Hours/Week: 30 hrs
Note:
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Elective – I:

- FEA – Finite Element Method
- Cryogenics
- Operation Research
- Tribology
- Production Management

DEPARTMENT OF TECHNOLOGY
FINAL YEAR B.TECH
Scheme of Teaching and Examination
Semester – VIII (Mechanical Engineering)

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credits	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
1.	Automobile Engineering	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
2.	Total Quality Management	03	-	-	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
3.	Mechatronics and Robotics	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
4.	Heat Power Engg.	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
5.	Elective – II	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
6.	Mechatronics and Robotics	-	-	02	01	--------	-------	--------	IPE	50	20
						--------	-------	--------	EOE	50	20
7.	Automobile Engineering	-	-	02	01	--------	-------	--------	IPE	--	--
						--------	-------	--------	EOE	50	20
8.	Major Project(Phase II)	-	-	06	03	--------	-------	--------	IPE	100	40
						--------	-------	--------	EPE	50	20
	Total	**19**	**-**	**10**	**24**	--------	**500**	--------	--------	**300**	--------

Total Credits: 24
Total Contact Hours/Week: 29 hrs
Note:
#: Minimum 40% marks must be secured in SEE to pass that head.

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Elective – II:

- CFD – Computational Fluid Dynamics
- Vibration and Noise
- Nano- Technology
- Machine Tool Design

Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester III)

Numerical Methods

Teaching Scheme: L: 4hrs/week			**Credits: 5**
: T: 1hrs/week			
Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

UNIT NO. I

Numerical solution of algebraic and transcendental equations

Bisection Method, iterative methods, False Position Method, Rate of convergence, Muller's Method, Newton-Raphson method for solution of system of non-linear Equations, Secant Method.

UNIT NO. II

Numerical solution of partial differential equations

Elliptical Equations- Laplace's equation Liebmann's Method, Secondary Variables, Boundary condition. Parabolic Equations- Heat equation, Explicit Method, Implicit Method, Crank Nicolson Method. Hyperbolic equations- Wave equation, Explicit Method.

UNIT NO. III

Interpolation and Approximation

Lagrange's interpolation formula, forward and backward difference interpolation formula, Newton's divided difference interpolation formula, Hermite interpolation formula, Cubic Spline interpolation.

UNIT NO. IV

Numerical differentiation and Integration

Numerical differentiation, methods based on interpolation, numerical integration, Error analysis, methods based on interpolation, Newton cotes methods, Error estimates for trapezoidal and Simpson's rule.

UNIT NO. V

Curve Fitting

Fitting of Curves by method of Least-squares, Coefficient of correlation, Spearman's rank correlation coefficient and lines of regression of bivariate data.

UNIT NO. VI

Statistics

Mean and standard deviation. Probability**,** addition and multiplication laws of probabilities. Random variable, Probability mass function and probability density function, Binomial, Poisson and Normal distributions.

Reference Books:

1) Numerical methods for scientific and Engineering Computation, M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International Limited Publishers.
2) Numerical method for Engineers - S.C. Chapra, R.P. Canale (Tata McGraw Hill Publications)
3) Numerical Methods – Dr. B.S. Grewal (Khanna Publications)
4) Numerical methods – E Balguruswamy (Tata McGraw Hill Publications)
5) Numerical Heat transfer and Fluid flow - S.U. Patankar (McGraw Hill Publications)
6) Introductory Methods of Numerical Analysis- S.S.Sastry (Prentice Hall Publication)
7) A text book of Applied Mathematics: Vol. I, II and III, Wartikar J. N. & Wartikar P. N. , Vidyarthi *Griha Prakashan, Pune.*
8) Fundamental of Statistics by S. C. Gupta.

Shivaji University, Kolhapur
Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester III)

ME 212 ELECTRICAL TECHNOLOGY AND COMPUTER PROGRAMMING C++

Teaching Scheme: L: 4 hrs/week **Credits: 4**

Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

UNIT 1

DC Motor

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

UNIT 2

Speed Control & Braking of Three Phase Induction motors 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. Electric Drives
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.

UNIT 3

Measurement of power & Power factor correction 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

COMPUTER PROGRAMMING USING C++ (SECTION)

UNIT 4

Object-Oriented programming: Introduction, Basic concepts, Benefits, objectoriented languages, Applications. 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

UNIT 5

Inheritance: Introduction, single inheritance; Types of base classes: Direct, Indirect; Types of derivation: Public, Private, Protected.

UNIT 6

Overloading: Function overloading with various data types, arguments; operator overloading: assignment operator; arithmetic & comparison operators. Polymorphism: Virtual functions; Abstract Base Classes, Constructor under Inheritance, Destructor under inheritance.

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++

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester III)

ME 213 Engineering Thermodynamics

Teaching Scheme: L: 3 hrs/week			**Credits: 3**
Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

UNIT 1

Basics of Thermodynamics

Approaches of study, Properties, Systems, Forms of Energy, Flow and Non flow processes and Cycles, States and Equilibrium, Zeroth Law of thermodynamics, Temperature scale

UNIT 2

Properties of Pure Substances:

Phases of pure substances, property diagrams for phase change processes, vapor pressure and phase equilibrium, property tables, ideal gas equation of states, Properties of gas mixture: Ideal and Real gases, compressibility factor

UNIT 3

First law of Thermodynamics:

Work and Heat, First law of thermodynamics: closed system, Internal energy, Enthalpy, Latent heat, Specific heats, Application of first law to processes and cycles, First law of thermodynamics: control volumes, Application of first law to steady flow processes

UNIT 4

Second law of Thermodynamics:

Limitations of first law, Statements of second law, reversibility and irreversibility, Carnot theorem and cycle, application of Carnot cycle to heat engine, refrigerator and heat pump

UNIT 5

Entropy and Availability:

Entropy-concept and its applicability, Principle of increase of entropy, Equality and inequality of Clausius, Entropy change for ideal gases, solids and liquids, Entropy change of a system during irreversible process, Entropy generation, Work Potential of Energy, Reversible Work and Irreversibility, Availability for closed and open system

UNIT 6

Vapor power cycles:

Vapor Processes, Work and Heat transfer, Change in entropy, Rankine cycle: Comparison of Rankine and Carnot cycle, Work done and efficiency, Specific steam consumption, Regeneration, Reheating, and Co-generation

Text Books

- P.K.Nag " Basic and Applied Thermodynamics", Tata McGraw Hill
- Rayner Joel, "Basic Engineering Thermodynamics", Addison Wesley Longman
- Yunus A. Cengel, " Thermodynamics – An Egineering Approach", Tata McGraw Hill.

Reference Books

- Hawkins G. A., “Engineering Thermodynamics” John Wiley and Sons.
- Van Wylen, Sonntag R. E., “Fundamentals of Classical Thermodynamics”, John Wiley and Sons.
- T.D. Eastop and A. McConkey, “Applied Thermodynamics”, Addison Wesley Longman
- Lynn D. Russell, “ Engineering Thermodynamics” Oxford University Press

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester III)

ME 214 Manufacturing Engineering. – I

Teaching Scheme: L: 4 hrs/week **Credits: 4**

Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

Unit 1

Hot and cold working of metals

Principles of rolling, forging, drop, press, upset, roll forging, extrusion, drawing, spinning, effect of hot working. **Cold working processes,** Cold rolling, swaging, forging, extrusionforward, backward and impact roll forming, tube drawing, wire drawing, spinning, shot penning, high energy rate forming, sheet metal working, types of presses, drives, different operations and types of dies.

Unit 2

Joining processes

Arc welding- Theory, SMAW, GTAW, GMAW, FCAW, Submerged arc welding, Stud welding Resistance welding- Theory, spot and seam projection welding processes Gas welding Friction welding, Ultrasonic welding, Thermit welding, EBW and LASER welding Use of adhesive for joining, classification of adhesives, types of adhesive and their application, surface preparation and various joints welding defects and quality

Unit 3

Foundry- Pattern making, moulding and casting

Sand casting, types of pattern material, pattern making allowances, core print moulding, sand properties and testing, hand and machine moulding, core boxes, core making, melting and pouring, melting furnaces- Cupola, fuel fired, electric arc and induction furnaces. Cleaning, finishing and heat treatment of casting, defects in casting lost foam processes, shell moulding and investment casting. Permanent mould dies casting- Die-casting, low-pressure permanent mould casting, hot and cold chamber processing, centrifugal casting, semi centrifugal casting and continuous casting

Unit 4

Lathe and drilling Machine

Turning and boring, lathe construction, accessories and operations. Thread cutting- single and multi start threading, concept of speed, feed and depth of cut. Introduction to boring Machines, Capstan and Turret lathe. Fundamentals of drilling processes, hoist, drill geometry, tool holder, types of drilling machines, operations performed on drilling machines, type of drill. Reaming processes and reamer types.

Unit 5

Milling, shaping and planing

Fundamental aspects, cutter types and geometry, Operations performed on milling machine, dividing head method of indexing. Construction, working and operations performed on shaper, planer, and broaching machines

Unit 6

Grinding

Grinding wheels, wheel marking, wheel selection, wheel mounting, types of grinding machines. Honing, lapping, super finishing, buffing and burnishing processes

Text Books

- Chapman W.A.-"Workshop Technology, Vol. II, III,& I", Edward Arnold Pub. Ltd. London
- Hajra Chaudhary S.K.- Elements of Workshop Technology, Vol. I& II, Media Prom & Pub, Mumbai.

Reference Books

- HMT Hand book- Production Technology
- Roy A. & Linberg- "Processes and materials of manufacturing", Prentice Hall of India Delhi.
- Campbell J.S. : Principles of manufacturing Materials and Processes, McGraw-Hill, New York.
- Begeman-"Manufacturing processes", Asia Publishing house Bombay.

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Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester III)

ME 215 FLUID MECHANICS

Teaching Scheme: L: 3 hrs/week **Credits: 3**

Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

Unit 1

Basics: Definition of fluid, fluid properties such as viscosity, vapour pressure, compressibility, surface tension, capillarity, Mach number etc, pressure at a point in the static mass of fluid, variation of pressure, Pascal's law, pressure measurement by simple and differential manometers using manometric expression.

Unit 2

Fluid Static: Hydrostatic forces on the plane and curved surfaces, centre of pressure, Buoyancy, centre of buoyancy, stability of floating bodies, metacentre and metacentric height its application in shipping.

Unit 3

Fluid Kinematics: velocity of fluid particle, types of fluid flow, description of flow, continuity equation, Coordinate free form, acceleration of fluid particle, rotational & irrotational flow, Laplace's equation in velocity potential and Poisson's equation in stream function, flow net.

Unit 4

Fluid Dynamics: Momentum equation, development of Euler's equation, Introduction to Navier-Stokes equation, Integration of Euler's equation to obtain Bernoulli's equation, Bernoulli's theorem , Application of Bernoulli's theorem such as venture meter, orifice meter, rectangular and triangular notch, pitot tube, orifices etc.

Unit 5

a) Laminar Flow: Flow through circular pipe, between parallel plates, Power absorbed in viscous flow in bearings, loss of head due to friction in viscous flow.

b) Turbulent Flow: Reynolds's experiment, frictional loss in pipe flow, shear stress in turbulent flow, major and minor losses, HGL and TEL, flow through series and parallel pipes.

Unit 6

a) Dimensional Analysis: Dimensional homogeneity, Raleigh's method, Buckingham's theorem, Model analysis, similarity laws and dimensionless numbers.

b) Introduction to boundary layer theory and its analysis.

c) Forces on Submerged bodies: Drag, lift, Drag on cylinder, Development of lift in cylinder.

Text Books

1. Dr. P.N. Modi and Dr. S.M. Seth - Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House.
2. Dr. R.K. Bansal - Fluid Mechanics and Hydraulic Machines - l, Laxmi Publication Pvt. Ltd., New Delhi.
3. Streeter, Wylie, Bedford - Fluid Mechanics, McGraw Hill Publication.

Reference Books

1. White - Fluid Mechanics, McGraw Hill Publication

2. Irving Shames - Mechanics of Fluid, McGraw Hill Publication

3. Murlidhar - Advanced Fluid Engineering, Narosa Publication.

4.G.S.Sawhney-Fundamentals of fluid mechanics, I.K. International Publishing House Pvt. Limited, New-Delhi, 2008 New York.

Shivaji University, Kolhapur
Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester III)
Laboratory
ME 216 Fluid Mechanics Lab

Teaching Scheme: P: 2 hrs/week **Credits: 1**

Evaluation Scheme: IPE: 50 **Minimum Passing Marks: 20**

List of Experiments:

1. Determination of viscosity using redwood viscometer.
2. Study of manometers and the demonstration of the same in the laboratory.
3. Determination of metacentric height of a floating body.
4. Flow pattern development using electrical analogy method.
5. Calibration of venturimeter or orifice meter.
6. Visualization of laminar and turbulent flow in the Halleshaw apparatus.
7. Determination of friction factor for flow through pipe.
8. Verification of Bernoulli's Theorem.
9. Calibration of V- notch or rectangular notch.
10. Study of minor losses in the flow system.

Shivaji University, Kolhapur
Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester III)
Laboratory
ME 216 Power Lab

Teaching Scheme: P: 2 hrs/week **Credits: 1**

Evaluation Scheme: IPE: 50 **Minimum Passing Marks: 20**
EPE: 50 **Minimum Passing Marks: 20**

List of Experiments: Any Eight

1) Experiment on Redwoods Viscometer
2) Determination of Aniline point
3) Determination of Cloud and Pour Point
4) Calibration of pressure gauges using dead weight pressure gauge
5) Demonstration of applications of first law of thermodynamics
6) Demonstration and Study of water tube boiler (Babcock and Wilcox boiler)
7) Demonstration and Study of boiler mountings and accessories
8) Determination of dryness fraction of steam
9) Experiment on bomb calorimeter
10) Visit to a industry/sugar factory for study of cogeneration plant
11) Demonstration on heat exchangers

Shivaji University, Kolhapur
Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester III)
Laboratory

ME 217 ELECTRICAL TECHNOLOGY AND COMPUTER PROGRAMMING C++

Teaching Scheme: P: 2 hrs/week **Credits: 1**

Evaluation Scheme: IOE: 50 **Minimum Passing Marks: 20**

Term Work: ELECTRICAL TECHNOLOGY(SECETION)

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)

Term Work: COMPUTER PROGRAMMING USING C++ (SECTION)

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)

Shivaji University, Kolhapur
Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester III)
Laboratory
ME 218 Machine Drawing

Teaching Scheme: P: 2 hrs/week **Credits: 1**

Evaluation Scheme: EPE: 50 **Minimum Passing Marks: 20**

Unit 1

Introduction to Machine Drawing:

Dimensioning Techniques, Representation of standard components such as Screw Threads, Screw fasteners, keys, couplings, bearings, pulleys, brackets, gears,locking arrangements, Rivets and riveted joints, Welding symbols. Pipe Joints :- Expansion joints, stuffing box and glands, piping layouts, conventional representation of pipe fittings, valves, joints, etc.

Unit 2

Limits, Fits and Tolerances:

ISO system of tolerance, Tolerance charts, Hole - base and shaft -base system of tolerance, Types of fits, symbols and applications. Geometric Tolerances: Introduction, Nomenclature, Rules, Symbols, values obtained from various manufacturing processes.

Unit 3

Surface Roughness & Production Drawing :

Surface Textures, Roughness values and Roughness Grades, Machining symbols Conventional Representation on part drawings. Production Drawing: Assembly and part drawings, Blue print reading, study and preparation of bill of materials.

Four sheets based on above syllabus.

1 sheet on Introduction to Machine Drawing
1 sheet on Limits fits and Tolerances
2 sheets on Assembly and deatials of Mechanical parts

Text Books

- K.L.Narayana, P.Kanniah, & K.V. Reddy , " Machine Drawing ".SciTech Publications (India Pvt. Ltd.) Chennai
- Ajeet Sing, "Working with AutoCAD 2000", Tata McGraw Hill.
- George Omura , "ABC of Autolisp " BPB Publications, New Delhi

Reference Books

- IS Code: SP 46 – 1988, Standard Drawing Practices for Engineering Institutes.
- Auto CAD & Autolisp Manuals by AutoDesk Corp., USA.
- Faculty of Mechanical Engineering, "Design Data", PSG College of Tech, Coimbatore.
- N.D.Bhatt and P.Kanniah, "Machine Drawing", Charotar Pub. House,Anand, Gujrath.
- S. Trymbaka Murthy, Computer Aided Engineering Drawing, I.K. International Publishing House Pvt. Ltd, Pune

Shivaji University, Kolhapur
Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester III)
Laboratory
ME 219 WORKSHOP PRACTICE-I

Teaching Scheme: P: 4 hrs/week **Credits: 2**

Evaluation Scheme: IPE: 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. 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.

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester IV)

Applied Mathematics

Teaching Scheme: L: 4hrs/week **Credits: 5**

: T: 1hrs/week

Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

Unit 1 Linear Differential Equations: Linear Differential Equations with constant coefficients, Homogenous Linear differential equations, method of variation of parameters.

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)

Unit 3 Partial differential equations: Four standard forms of partial differential equations of first order.

Unit 4 Applications of Partial differential equations: Wave Equation, One and two dimensional heat flow equations, method of separation of variables, use of Fourier series.

Unit 5 Laplace Transform: Definition, L.T. of standard functions, Properties and theorems of Laplace transforms, Inverse L.T., Applications of L.T. to solve LDE (Initial value problems).

Unit 6 Vector Calculus:

Vector Differentiation: Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Solenoidal, Irrotational and Conservative field. Vector Integration: The line integral, Surface integral, volume integral, Gauss's Divergence theorem, Stoke's theorem, Green's theorem (Without proof).

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. Advanced Engineering Mathematics, M.D.Greenberg Pearson Education

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester IV)

ME 222 MECHANICS OF MATERIALS

Teaching Scheme: L: 3 hrs/week **Credits: 4**
: T: 1hrs/week

Evaluation Scheme:	CIE	SEE	Minimum Passing Marks
	(25 + 25)	50	40
	IOE		
	50		

Unit 1

Simple stresses and strains

a) Concept of stress and strain (linear, lateral, shear and volumetric) Hooks law. Elastic constants and their relationship. Generalized Hook's law.

b) Axial force diagram, stresses, strains and deformation in determinate and indeterminate homogeneous and composite bars under concentrated loads, self-weight and temperature changes.

Unit 2]

a) Shear force and bending moment diagrams

Concept and definition of shear force and Bending Moment in beams due to concentrated load, UDL, uniformly varying loads and couples in determinate beams. Relation between SF, BM and intensity of loading, construction of SF, and BM diagrams for cantilevers, simple compound beams and bend.

b) Stresses due to bending

Theory of simple bending, concept and assumptions, Derivation of Flexure formula. Bending stress distribution diagram. Moment of resistance and section modules calculations.

Unit 3

a) Shear stress distribution in beams

Shear stresses concept, derivation of shear stress distribution formulae, shear stress distribution diagram for common symmetrical sections, maximum and average shear stress, shear connection between Flange and web. Bending of curved bars beams, stresses in ring, chain link, and crane hooks.

b) Torsion of circular shaft

Theory of torsion of shafts of circular, cross section. Assumptions, Derivation of torsion formulae, stresses strains and deformation in determinate and indeterminate shafts of hollow, solid, homogeneous and composite circular cross section subjected to twisting moments, stresses due to combine torsion, bending and axial force on shafts.

Unit 4

a) Principal stresses and principal strain

Normal and shear stresses on any oblique planes and concept of principal planes and principal planes by analytical and graphical methods (Mohr's circle of stress 2-D).

b) Pressure Vessels.

Stresses, strains and deformation in thin walled seamless cylindrical and spherical vessels due to internal fluid pressure. Change in volume, effects of additional compressible or Incompressible Fluid injected under pressure. Thick cylinders. Derivation of Lane's equation for stresses.

Unit 5

a) Axially loaded columns.

Concept of critical load and buckling, derivation of Euler's formulae for buckling load with hinged ends, concept of equivalent length for various end conditions. Rankeine's formulae, safe load on column, Limitations of Euler's formulae.

b) Strain energy and impact.
Concept of strain energy, derivation and use of expressions for deformation of axially loaded members under gradual sudden and impact loads.

Unit 6

Slope and Deflection of Determinate Beams.

a) Concept and definition, relation between B.M., slope and deflection slope and deflection by double integration method (McCauley's method).

b) Slope and Deflection in determinate beams by Moment Area method and conjugate beam method.

Text Books

- Ramamurtham, Strength of Materials
- Beer and Johnston - Strength of Materials. - CSB Publisher.

Reference Books

- Gere &Timoshenko – Mechanics of Material. – CSB Publisher 1984.
- E.P. Popov – Introduction to Mechanics of solids. – Prentice Hall Publication.
- Singer and Pytel – Strength of Materials. – Harper and Row Publications.
- Timoshenko and Young – Strength of Materials. – CSB Publisher

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester IV)

ME 223 THEORY OF MACHINES – I

Teaching Scheme: L: 4hrs/week **Credits: 5**
: T: 1hrs/week

Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

Unit 1

Fundamentals of kinematics and mechanisms.

Definition of link, Pair, chain structures, mechanisms, machine, inversion of four bar chains, single and double slider crank chain, equivalent linkage of mechanism. Degrees of freedom, Grubler's criteria, straight line mechanism, pantograph, Geneva mechanism, steering gear mechanisms, Hooke's joint.Introduction to compliant mechanism

Unit 2]

Velocity and acceleration analysis.

Relative velocity acceleration methods, Corioli's component of acceleration, instantaneous center of velocity, Kennedy theorem of three center in line, body and space centrode, velocity and acceleration in slider crank mechanism b analytical methods and Klein's construction.

Unit 3

Static and dynamic force analysis.

Static force analysis of slider crank mechanism, D'Alembert's principle, methods of finding inertia of rigid bodies, compound pendulum, bifilar and trifilar suspension methods, inertia forces in engine mechanisms analytical and graphical methods, dynamically equivalent system, correction couple, inertia of geared system.

Unit 4

Theory of Gears I

Classification. Spur gear: definition, terminology, fundamental law of toothed gearing, involute and cycloidal profile, conjugate action, contact ratio, minimum number of teeth, interference and under cutting. Helical gears: nomenclature, center distance, virtual number of teeth.

Unit 5

Theory of Gears II

Spiral Gears, Worm and worm Gears, Bevel Gears; their terminologies, center distance, force analysis and efficiency.

Unit 6

Governor Mechanisms

Introduction, Types, Governor Effort and governor power, Controlling force analysis, sensitivity, stability, isochronisms and hunting, friction, insensitiveness

Text Books.

1. Rattan, S. S. "Theory of Machines", Tata MCGraw Hill.

2. Ballaney, P. "Theory if Machines and Mechanisms", Khanna Publications.

3. Bansal, R. K. "Theory of machines", Laxmi Publications Pvt. Ltd, New Delhi.

Reference Books.

1. Ramamurthy, V. “Mechanisms of Machines”, Narosa Publishing House.

2. Uicker Jr, J. J., Penock G. R. and Shigley, J. E. “Theory oif Machines and Mechanisms’ Tata McGraw Hill.

3. John Hannah and Stephens, R. C. “Mechanics of Machines: Advanced Theory and Examples”, Edward Arnold London.

4. Bevan Thomas “The Theory of Machines”, CBS publishers and distributors.

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester IV)

ME 224 FLUID & TURBO MACHINERY

Teaching Scheme: L: 3 hrs/week **Credits: 3**

Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

UNIT 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.

UNIT 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.

UNIT3

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.

UNIT 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.

UNIT 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)

UNIT 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, erformance, comparison with centrifugal.

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 Pearson Education

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECH. ENGINEERING) (Semester IV)

ME 225 Material Science and Metallurgy

Teaching Scheme: L: 4 hrs/week **Credits: 4**

Evaluation Scheme:	**CIE**	**SEE**	**Minimum Passing Marks**
	(25 + 25)	**50**	**40**
	IOE		
	50		

Unit 1

Engineering Steels:

Iron - Iron carbide equilibrium diagram, critical temperatures. Allotropy, cooling curve and volume changes of pure iron. Microstructures of slowly cooled steels, estimation of carbon from Microstructures, non-equilibrium cooling of steels. Widmanstatten structures, Structures - property relationship.

Unit 2

Alloy Steels

Classification and applications of steels, specifications of some commonly used steels for engineering applications (e.g. En, DIN, IS etc. with examples). Effects of alloying elements. Classification of alloying elements. Examples of alloy steels. Stainless steels. Tool steels and tool materials.

Unit 3

Heat Treatment of Steels:

Transformation products of austenite, Time temperature Transformation diagrams, Critical cooling rate, continuous cooling transformation diagrams. Heat treatment of steels, Cooling media. Annealing, normalizing, hardening. Tempering, Carburising, nitriding, carbonitriding, Flame and Induction hardening. Commercial heat treatment practice of gears of different sizes, tools, lathe beds, springs, etc.

Unit 4

Cast Irons:

Classification of Cast irons Gray cast irons, nodular cast irons, white cast irons, malleable cast irons, chilled. Effect of various parameters on structure and properties of cast irons. Applications of cast irons for different components of machine tools, automobiles, pumps, etc.

Unit 5

Mechanical Testing:

Tension test - Engineering and true stress strain curves, Evaluation of properties. Types of engineering stress-strain curves. Cupping test on sheet metal. Hardness test Brinell, Poldi, Vickers, Rockwell. Durometers, Microhardness. Hardness conversions. Impact test Charpy and Izod. Fatigue test. Creep test.

Unit 6

Non Destructive Testing:

Magnaflux, dye penetrant, ultrasonic tests, radiography and eddy current testing.

Pyrometry: Principle, operation and uses of various pyrometers. Thermocouples, thermocouple materials. Resistance pyrometer. Disappearing filament pyrometer, total radiation pyrometer.

Powder Metallurgy: Concept, Basic Procedure, Application, Merits & Demerits

Text Books

- S.H. Avner: Physical Metallurgy, Tata McGraw Hill.
- Askland & Phule, Material science & Engineering of materials

Reference Books

- V. Raghvan, Materials Science & Engineering, PHI 5th Edition, 2003.
- Baldev Raj, T. Jayakumar and M. Thavasimuthu : Practica Non-destructive Testing, Narosa Publishing House, Delhi.
- W. Callister, Materials Science & Engineering, Wiley.
- Clark D. S. and Varney W. R. Physical Metallurgy for Engineers, Affiliated East-West Press, New Dehli.

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester IV)
Laboratory
ME 226 FLUID & TURBO MACHINERY

Teaching Scheme: P: 2 hrs/week **Credits: 1**

Evaluation Scheme: IPE: 50 **Minimum Passing Marks: 20**
EPE: 50 **Minimum Passing Marks: 20**

Any Seven experiments from 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

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester IV)
Laboratory
ME 227 Theory Of Machine - I

Teaching Scheme: P: 2 hrs/week **Credits: 1**

Evaluation Scheme: EOE: 50 **Minimum Passing Marks: 20**

A term work shall consist of report on 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 involute and cycloidal profile. (Minimum two problems)
7) Governor characteristics for Porter or Hartnell governor.

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester IV)
Laboratory
ME 227 Material Science and Metallurgy Lab

Teaching Scheme: P: 2 hrs/week **Credits: 1**

Evaluation Scheme: IPE: 50 **Minimum Passing Marks: 20**
EOE: 50 **Minimum Passing Marks: 20**

1. Study of effect of a heat treatment process on tensile strength of a sample, e.g. Mild steel.
2. Study of effect of a heat treatment process on hardness of a test sample, e.g. Mild steel.
3. Study of effect of a heat treatment process on Impact strength of a test sample, e.g. Mild Steel.
4. Non-Destructive tests: Magnaflux testing, Dye penetrant testing and Ultrasonic testing.
5. Study and drawing of microstructures of mild steel, medium carbon steel, eutectoid steel and hypereutectoid steel.
6. Study and drawing of microstructures of brass. Tin bronze, Al-bronze, Babbit metal.
7. Study and drawing of microstructures of white malleable, gray and nodular cast irons.
8. Study and drawing of microstructures of hardened steel, tempered steel.

Shivaji University, Kolhapur

Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester IV)
Laboratory
ME 229 Workshop Practice – II

Teaching Scheme: P: 2 hrs/week **Credits: 1**

Evaluation Scheme: EPE: 50 **Minimum Passing Marks: 20**

1. Demonstration of various hand tools used in workshop
2. Visit to a factory to study the various foundry and foundry related operations
3. Fabrication of a job involving turning, drilling, milling and welding (One or two jobs)

Shivaji University, Kolhapur
Department of Technology

Second Year B. Tech (MECHANICAL ENGINEERING) (Semester III AND IV)
AC 221 ENVIRONMENTAL STUDIES

Teaching Scheme
Examination Scheme
Lectures: 2 Hrs/week — **Theory** : 70 Marks
Project : 30 Marks

Terms of References

In pursuance of the verdict of the Hon'ble Supreme Court, (Writ Petition (Civil) No. 72/1998) the University Grants Commission has formed a Committee of experts on Environmental Studies. The Committee has looked into all the pertinent questions, issues and other relevant matters. This was followed , framing of the core module syllabus of Environmental Studies for all undergraduate courses. The UGC has made it compulsory to all universities and colleges in India as per the directives of the Hon'ble Supreme Court of India. (UGC DO No. F.13-1/2000 (EA/ENV/COS-I) 24 July 2002). The Directorate of the Higher Education, Government of Maharashtra through its letter No. NGC/2003/32224/MV-1, Higher Education, 14 January 2004 has also made it compulsory to comply with the decision of Hon'ble Supreme Court.

Hon'ble Vice-Chancellor has endorsed the scheme to the Dean of Social Science faculty for designing the Course Curricula. Accordingly it has been studied thoroughly and the Scheme of its implementation has been prepared & forwarded to the colleges.

Vision

The importance of environmental science and environmental studies cannot be disputed. The need for sustainable development is a key to the future of mankind. Continuing the problems of pollution, loss of forest, solid waste disposal, degradation of environment, issues like economic productivity and national security, global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues. The United Nations Conference on World Summit on Sustainable Development at Johannesburg in 2002 have drawn the attention of people around the globe to the deteriorating condition of our environment. It is clear that no citizen of the earth can afford to be ignorant of environmental issues. Environmental management has captured the attention of health care managers. Managing environmental hazards has become very important. Human beings have been interested in ecology since the beginning of civilization. Even our ancient scriptures have emphasized about practices and values of environmental conservation. It is now even more critical than ever before for mankind as a whole to have a clear understanding of environmental concerns and to follow sustainable development practices. India is rich in biodiversity which provides various resources for people. It is also the basis for biotechnology. Only about 1.7 million living organisms have been described and named globally. Still many more remain to be identified and described. Attempts are made to conserve them in ex-situ and in-situ situations. Intellectual property rights (IPRs) have become important in a biodiversity-rich country like India to protect microbes, plants and animals that have useful genetic properties. Destruction of habitats, over-use of energy resources and environmental pollution have been found to be responsible for the loss of a large number of life-forms. It is feared that a large proportion of life on earth may get wiped out in the near future.

Inspite of the deteriorating status of the environment, study of environment has sofar not received adequate attention in our academic programmes. Recognizing the significance of the Environmental Studies, as a new paper has to be introduced at the Second Year Degree Course in all faculties.

Application

A new paper on Environment Studies has been introduced at all the Second Year Degree Course as a compulsory certificate course in Environment Studies from the academic year 2005-06 with a duration of six months. The examination will be conducted during the second term of the academic year. The total marks allotted to this course is 100 mark including a

field work reporting of 30 Marks. There will two streams of the students offering to this course.

a) One will be of self-study in nature. Reading material will be supplied to a student , the University. Each student offering this stream has to attend 20 contact periods spread in six months of the first term and has to pay a fee of Rs. 150/-. The honorarium of these contact lectures will be paid , the college out of the fees collected at the rate of Rs. 100/- per lecture hour. Out of the collected Rs. 50/- should be transferred to the University.
b) The students offering to another stream has to pay Rs. 250/- as fee of the course. Under the stream students will be taught as per the syllabus, regularly in 40 lecture hours, plus 10 hours of field work. Out of the fees collected Rs. 50/- per student has to be transferred to the University. The remaining amount can be used for payment of honorarium to a teacher teaching the said course at the rate or Rs. 100/- per lecture.
c) The external students have to appear for the said certificate course.
d) The Project Report has to be submitted as per the guideline given below.
e) The field project is to be carried out individually , every student under the supervision of the concerned teacher. The project topic is expected to be on the local/ regional environmental issue. the project theme is to be essentially need based, time bound (six months) and result / action oriented. Model topics/ themes along with methodology will be given in the resource material of the course.

The project report is to be prepared as per the prescribed format, in typed form and with spiral binding. The project report is to be submitted prior to the written examination. Central evaluation procedure is to be followed for the assessment of the project reports.

Examination Pattern

In the case of awarding the marks, the question paper will carry 100 marks. The structure of the question paper being:

1	Objective/To the point./Exercise Type answers	10 marks
2	Short answer pattern (3 out of 5)	15 marks
3	Short Notes (3 out of 5)	15 marks
4	Essay type questions with internal choice (one question of 10 marks shall be on field work)	30 marks
5	Field Work Reporting	30 marks

Field Work Reporting

A format of field work Report shall be of the following in nature.

Cover Page :	Name of the College and Department Title of the Project Name of the Student Name of the Supervisor Year of Submission	**Content Page** : Contents List of Tables, Diagrams, Figures, Photographs etc.
Second Page	Declaration of the Student	**Chapter – I** : Research Methodology
Third Page	Certificate of the Supervisor (countersigned by the Head & Principal)	**Chapter – II** : Reporting **Last Chapter** : Summary and Findings Bibliography

The field work reporting will be the exclusive work of the students to be submitted under the guidance of the Department faculty. The reports will be assessed , the Panel of Examiners in the respective subjects prepared , the BOS and approved , the 32 (5) and BOE.

Medium of Instruction

The medium of instruction for Law, Science, Medical and Engineering faculties will be English and for Arts, Social Sciences and Commerce medium of instruction will be English or Marathi.

Qualifications of the Teacher

The paper is to be taught in 4 lectures per week. The qualifications to teach the paper of the teachers will be as under:

1. P. G. with B+ in Environment Science
2. If qualified teacher is not available initially, temporary arrangements can be made from the permanent teachers, who has published work or expository articles or books written on Environmental Studies or completed workshops/refresher course/training programme of three weeks duration on Environmental Studies.

Declaration of the Result, Issuing of the Certificate, Re-appearing for the Examination and Grades.

1 The certificate course can be cleared in the third year. If candidate remains absent or fails in the course in the second year of the degree course.
2 The candidate will have to pass in the examination of the certificate course in Environmental Studies in order to obtain degree certificate from the University.
3 Results of the theory examination will be declared only after submission of the field work report to the college.
4 A candidate has to pass this paper in order to obtain degree certificate. If the candidate passes in all subjects of degree course but fails in this paper, he will not obtain degree certificate.
5 The marks obtained , a student will be converted into grades as bellow
Grade 0 - above 75
A - 61 to 75 B - 51 to 60 C - 40 to 50
6. Certificate with grade obtained will be issued , the University.
7. The scheme is made applicable start from a academic year 2005-06 for second year students of all faculties.
8. The Principal can appoint Course Coordinator to organize teaching and evaluation.

SYLLABUS

1. Nature of Environmental Studies
Definition, scope and importance. (2 lectures)
Multidisciplinary nature of environmental studies
Need for public awareness.

2. Natural Resources and Associated Problems.
a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Usage and exploitation, environmental effects of extracting and using mineral resources.
d) Food resources: World food problem, changes caused , agriculture effects of modern agriculture, fertilizer-pesticide problems.
e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
g) Role of an individuals in conservation of natural resources. (8 lectures)
h) Equitable use of resources for sustainable lifestyle.

3. Ecosystems
- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession.
- Food chains, food webs and ecological pyramids.

Introduction, types, characteristics features, structure and function of the following ecosystem:-
a) Forest ecosystem,
b) Grassland ecosystem,
c) Desert ecosystem,
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (8 Lectures)

4. Biodiversity and its Conservation

- Introduction – Definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Western Ghat as a bio-diversity region.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. (8 Lectures)

5. Environmental Pollution

Definition : Causes, effects and control measures of:

a) Air pollution,
b) Water pollution,
c) Soil pollution,
d) Marine pollution,
e) Noise pollution,
f) Thermal pollution,
g) Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies
- Diaster management : Floods, earthquake, cyclone and landslides. Tsunami (8 Lectures)

6. Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns.
- Environmental ethics: Issue and possible solutions.
- Climate change, Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.
- Wasteland reclamation.
- Consumerism and waste products. (8 Lectures)

7. Environnemental Protection

- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Population Growth and Human Health, Human Rights. (8 Lectures)

8. Field Work (10 Lectures)

- Visit to a local area to document environmental assetsriver/ forest/grassland/hill/mountain or
- Visit to a local polluted site – Urban/rural/Industrial/Agricultural or
- Study of common plants, insects, birds. or
- Study of simple ecosystems-ponds, river, hill slopes, etc.
  (Field work Equal to 10 lecture hours)

Total = 60 hours

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    (M) Magazine
    (R) Reference
    (TB) Textbook
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