SCHEME OF EXAMINATION
B. Tech. (Mechanical Engineering) 3rd Semester

CODE	COURSE	L	T	P	Credits
MEPC201	Manufacturing Processes	3	0	0	3
MEPC202	Fluid Mechanics	3	0	0	3
MEPC203	Strength of Materials – I	3	0	0	3
MEPC204	Machine Drawing	1	0	5	3
MEPC205	Kinematics of Machines	3	0	0	3
IC*	Machine Learning and Data Analytics	3	0	2	4
MEPC206	Fluid Mechanics (P)	0	0	2	1
MEPC207	Strength of Materials (P)	0	0	2	1
SWNC101	NCC/Sports/Yoga	0	0	2	1*
SWNC102	NSS/Clubs/Technical Societies	0	0	2	1*
	Total Credits				21

***** *Continuous Evaluation Model as per guidelines and the credit to be awarded at the end of 6th Semester based on Cumulative performance up to 6th Semester*

SCHEME OF EXAMINATION
B. Tech. (Mechanical Engineering) 4th Semester

CODE	COURSE	L	T	P	Credits
MEPC208	Dynamics of Machines	3	0	0	3
MEPC209	Strength of Materials – II	3	0	0	3
MEPC210	Fluid Machines	3	0	0	3
MEPC211	Production Technology – I	3	0	0	3
MEPC212	Industrial Engineering	3	0	0	3
MEPC213	Introduction to MATLAB Programming	2	0	3	3
MEPC214	Theory of Machines (P)	0	0	2	1
MEPC215	Fluid Machines (P)	0	0	2	1
MEPC216	Production Technology – I (P)	0	0	2	1
SWNC101	NCC/Sports/Yoga	0	0	2	1*
SWNC102	NSS/Clubs/Technical Societies	0	0	2	1*
	Total Credits				21

***** *Continuous Evaluation Model as per guidelines and the credit to be awarded at the end of 6th Semester based on Cumulative performance up to 6th Semester*

MEPC-201: MANUFACTURING PROCESSES

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
3	--	--	3	40

Brief Description about the course

Introduction to the processes in which physical objects are manufactured. Topics include casting, machining, sheet metal operations, welding processes, forming processes, etc.

UNIT- I

An Overview to Manufacturing: Introduction to manufacturing process - Selecting manufacturing process – global competitiveness of manufacturing costs – Fundamentals of materials – their behaviour and manufacturing properties – Ferrous metals and alloys – Non Ferrous metals and alloys **(8 hrs)**

UNIT- II

Casting Process: Pattern materials, types of allowances, type of patterns, type of mould, desirable properties of moulding materials, Solidification of Alloys and its mechanism – Gating system design and estimation of solidification time – Riser Design and Riser placement – Defects and Product Design. core, core print, type of cores, various casting types, casting defects & remedies advantages, disadvantages and application of casting.

Machining Process: Machining process: Various machining process and its working principles – Metal Cutting: Tool geometry – single edge tools – reference plane – Tool specifications –ASA, NRS – Mechanics of Orthogonal cutting and Oblique cutting – Tool wear and Tool life – Economics of Machining **(14 hrs)**

UNIT- III

Forming Process: Forging, Rolling, Drawing, Extrusion – Classification, Defects and Inspection. Sheet metal forming process – Shaping process for plastics – Extrusion, Injection and Compression Molding. Sheet metal operations: Introduction to shearing, blanking and punching, notching, trimming, lancing, nibbling, bending, stretching, embossing and coining. **(10 hrs)**

UNIT- IV

Welding Process: Definition and classification, thermit welding, electric arc welding: MMAW, SAW, TIG, MIG, gas welding, resistance welding, brazing and soldering, welding defects and remedies, real-life case studies. **(8 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books / Reference

1. Jain R.K., Production Technology, Khanna Publishers, 2001.
2. Hajra Choudhry, Elements of Workshop Technology, Vol – II Media Promoters & Publishers, 1994.
3. P N Rao, Manufacturing Technology (Vol. 1 & 2), McGraw Hill Education.
4. Amitabha Ghosh & A K Mallik, Manufacturing Science, Affiliated East-West Press Pvt. Ltd.
5. Production Technology by HMT, Tata McGraw-Hill, 2002.
6. Chapman, W.A.J., Workshop Technology, Vol - II, Oxford & IBH Publishing Co. Ltd., 1986.
7. Khanna, O.P., and Lal, M., A Text Book of Production Technology, Vol II, Dhanpat Rai & Sons, 1992.
8. Yoram Koren, Computer Control of Manufacturing Systems, McGraw-Hill, 1986.

9. Choudhry, S.K.H., Elements of Work Shop Technology, Vol II, Media Promoters & Publishers, 1994.
10. Kundra, T.K., Rao. P.N., and Tiwari, N.L.K., Numerical Control and Computer Aided Manufacturing, Tata McGraw-Hill, 2006.
11. Serope Kalpakjian; Steven R.Schmid (2010), Manufacturing Engineering and Technology, 6th Edition, Publisher: Prentice Hall, ISBN-10 0 13 – 608168-1.

Course Outcomes

CO 1: Decide and recommend cost effective and reliable engineering materials for the development of an existing and innovative product.

CO 2: Decide and recommend appropriate manufacturing processes for a product under given conditions and constraints.

CO 3: Recognize the different types of casting, welding, and forming processes for various industrial applications.

CO 4: Explain the features and applications of various machining processes.

MEPC202: FLUID MECHANICS

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief description about the course:

i. To understand the various properties of fluid and instruments for measurement of pressure
ii. To study the behavior of fluid at rest and in motion
iii. To study in detail viscous and turbulent flow and flow of fluid in pipe.
iv. To understand the concept of boundary layer, study of lift & drag and streamlined bodies.

UNIT- I

Fluid Statics: Properties of fluid, Fluid pressure, Pascal's law, General equation of Fluid statics, Pressure head of a fluid, Absolute and gauge pressure, Measurement of pressure, Simple manometers, Differential manometers, Mechanical gauges, Force on submerged surfaces: Horizontal, Vertical, Inclined, Curved, Dams and gates. Buoyancy: Stability of submerged and floating bodies, Determination of metacentric height: analytical and experimental methods, Oscillation of floating body.

Fluid Kinematics: Lagrangian and Eulerian methods, flow lines, types of flow (Steady, unsteady, compressible, incompressible, ideal, real, uniform, non-uniform, Rotational and Irrotational, Laminar and turbulent, 1-D, 2-D and 3-D) Velocity and acceleration, Rate of flow, Continuity equation, Continuity equation in 3-D (differential and Polar), Stream function, Velocity potential function, Flow nets, Types of motion: linear translation, linear deformation, angular deformation and rotation.

(13 hrs.)

UNIT- II

Fluid Dynamics: Euler's equation, Bernoulli's equation, Energy equation, Practical applications of Bernoulli's equation (Venturimeter, Orifice meter, Pitot tube), Kinetic energy and momentum correction factors, Momentum equation.

Viscous Flow: Reynolds experiments, Flow of viscous fluid in circular pipes, Hagen-Poiseuille equation, Flow through an annulus and two parallel plates, Power absorbed in bearings, Movement of piston in dash-pot, Viscometers; capillary tube, falling spheres, rotating cylinder, efflux.

(9 hrs)

UNIT- III

Turbulent flow: Loss of head in pipes, Shear stress in turbulent flow, Hydraulically smooth and rough boundaries, Velocity distribution in pipes, Velocity distribution in terms of average velocity, Power law, Friction coefficients of smooth and rough pipes.

Pipe flow: Major and Minor losses in pipes, Hydraulic gradient and total energy lines, Pipes in series, Pipes in parallel, Equivalent pipe, Siphon, Power transmission through pipes, Water hammer, Flow through nozzles. **(9 hrs.)**

UNIT- IV

Boundary layer theory: Introduction, Description of a boundary layer on a thin flat plate, Boundary layer parameters (boundary layer, displacement, momentum, and energy thickness), Von-Karman integral momentum equation, Boundary layer separation, Methods to prevent boundary layer separation.

Immersed bodies: Lift and drag, Lift and drag coefficients, Streamlined and bluffed bodies Drag on a cylinder (2D body), Drag on a sphere, Circulation and lift on a cylinder, Airfoil, Lift and drag on an airfoil. Use of Fluid Engineering in sustainable development and related case studies. **(9 hrs.)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books / References:

1. Som and Biswas, Introduction to Fluid Mechanics and Machinery, Tata McGraw Hill, 3rd Edition, 2011.
2. Robert W. Fox, Philip J. Pritchard, Alan T. McDonald, Introduction to Fluid Mechanics, Wiley India, 8th Edition, 2012
3. Merle C. Potter, David C. Wiggert, Fluid Mechanics, Cenage Learning (India Edition), 2nd Edition, 2011.
4. Frank M. White, Fluid Mechanics, McGraw-Hill Education; 7th Edition, 2010.
5. D. S. Kumar, Fluid Mechanics and Fluid Power Engineering, S.K. Kataria & Sons, 8th Edition, 2013.
6. P.N. Modi, S.M Seth, Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, 19th Edition, 2009.
7. S.S. Rattan, Fluid Mechanics and Hydraulic Machines, Khanna Book Publishing, 2014.
8. P. Balachandran, Engineering Fluid Mechanics, Prentice Hall India, 2102.
9. R. K. Bansal, Fluid Mechanics and Hydraulic Machines, Laxmi Publications, 9th Edition, 2017.

Course Outcomes:

At the end of this course, the student will be able to

CO1: Measure pressure, calculate forces on submerged surfaces, predict stability of submerged & floating bodies and understand various types of flow & fluid motion.

CO2: Calculate pressure variations in accelerating fluid using Bernoulli's equation.

CO3: Understand viscous flow & turbulent flow behavior, evaluate head losses in pipes.

CO4: Understand the concept and importance of boundary layer, lift & drag.

MEPC203: STRENGTH OF MATERIALS-I

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

This course will introduce the students to a thorough understanding of structural members and their strength, stiffness, and stability. Develop an understanding of, and the capability to, solve practical engineering problems involving stress and strain analysis in elementary structural members, such as bars and beams. To this end, the learning objectives of this course are:

1. To learn about the simple and compound stresses at a point in a material and its evaluation.
2. To understand the concept of strain energies that forms the basis of analysis in many cases.
3. To know about the shear forces, bending moments, bending stresses and shear stresses in a beam.
4. To study various methods to find the deflection of beams under various load conditions.
5. To study the various theories of failure of materials.

UNIT – I

Simple Stress and Strain: Mechanical Properties of Materials, Concept of stress and strain, various type of stresses, stress-strain diagrams, composite sections, Thermal stresses, strain analysis, relation between elastic constants.

Compound Stress and Strain: Principal stresses and principal planes, Mohr's stress circle, Principal strains, Mohr's strain circle, Relation between principal stresses and principal strains.

(10 hrs)

UNIT – II

Shear Force and Bending Moment Diagrams: Shear force and bending moment diagrams for various types of loading and supports, Point of contra flexure, Loading and bending moment diagrams from shear force diagrams.

Centroid and Moment of Inertia: Centroid of laminas of various shapes, Moment of inertia of laminas of different shapes.

Strain Energies: Resilience, strain energy due to various types of loading. (**10 hrs)**

UNIT – III

Bending Stress in Beams: Stresses due to simple bending, Composite or Flitched beams, combined direct and bending stress

Shear Stress in Beams: Shear stress distribution, Variation of shear stress in beams of various sections (**10 hrs)**

UNIT – IV

Slope and Deflection: Slope and deflection at a point using different methods, deflection of beams due to shear stress.

Theories of Failure: Different theories of failure, Significance, graphical representation.

(**10 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books / Reference

1. G H Ryder, *"Strength of Materials",* ELBS, 3rd edition, 1969
2. S S Rattan, "Strength of Materials", Tata McGraw Hill, India, 3rd Edition, 2017
3. Beer P F and Johnston (Jr) E R, *"Mechanics of Materials",* McGraw Hill Education, 7th edition, 2015.
4. Popov E P, *"Engineering Mechanics of Solids",* Prentice Hall of India, New Delhi, 2nd edition, 1999.

Course Outcomes

CO 1: Determine the values of stresses in materials
CO 2: Draw shear force and bending moment diagrams
CO 3: Evaluate strain energies in materials
CO 4: Find shear and bending stresses in beams
CO 5: Find slope and deflection of beams
CO 6: Explain different theories of failure

MEPC204: MACHINE DRAWING

Prerequisite: Engg. Graphics

L	T	P	Credits	Total Contact Hours
1	-	5	3	78

Brief Description about the course:

The student is enabled to:

- Study the conventions and rules to be followed by engineers for making accurate drawings.
- Understand the basic dimensioning practices that have to be followed in the preparation of drawings.
- Prepare the assembly of various machine or engine components and miscellaneous machine components.
- Visualize the assembly and sub assembly of various machine elements.

UNIT-I

Fasteners: Definition of various parts of a screw thread, Popular Forms, Conventional representation, Multiple start threads, Right and Left Hand threads, Screwed Fasteners bolts, nuts, stud bolts, tap bolts, set screws, Riveted joints for plates, Various types of welded joints and conventions **(18 Hrs)**

Joints: Drawing of simple machine parts i.e. cotter joint, knuckle joint **(06 Hrs)**

.

Bearing and Couplings: Simple solid, bushed, pedestal, footstep bearings, Flanged couplings Flexible couplings-Bushed pin type flanged coupling **(09 Hrs)**

UNIT—II

Assembly Drawing: Introduction of unit assembly drawing, Practice in drawing details and assembly of simple units like:

- Simple Steam Engine Parts; Stuffing boxes, Cross heads, Eccentrics
- Boiler Mountings: Steam stop valve, feed check valve and safety valves.
- Machine tool parts: Tool Post, Tool Head of a Shaper. **(45 Hrs)**

Note: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text / Reference Books:

1. Machine Drawing - N.D. Bhatt, Charotar Publisher.
2. Machine Drawing - Sidheshwar, Tata McGraw-Hill
3. A text book of Machine drawing - R.B. Gupta, Satya Prakasham Tech. Pub.
4. Machine Drawing –K.L.Narayana, P.Kannaiah& K. Venkata Reddy,New Age Publishers
5. Machine Drawing – P.S.Gill.
6. Machine Drawing – Luzzader
7. Machine Drawing – Rajput

Course outcomes:

At the end of the course students are able to:

CO1: Demonstrate knowledge about the various practices with regard to the dimensioning, sectioning and development of views.

CO2: Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings

CO3: Develop assembly drawings using part drawings of machine components with dimensions and bill of material during design and development.

CO4: Enhance their ability to work as practicing mechanical engineers in manufacturing Industries and consulting firms

MEPC205: KINEMATICS OF MACHINES

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

Kinematics of Machines involves study from geometric point of view to know the displacement, velocity and acceleration of various components of mechanisms without bothering about the input force or torque. In Kinematics of Machines, underlying concepts and methods behind Mechanism and Machines, velocity and acceleration by Graphical methods, Computer aided analysis and synthesis of Mechanism, Cams and followers, belt, Rope and chain drive, lower pairs and Friction are addressed.

UNIT - I

Mechanism and Machines: Kinematics, introduction to analysis and synthesis of mechanisms, Classification of mechanisms – Basic kinematic concepts and definitions, Mechanism & Machines. rigid and resistance body, link, Kinematic pair, Types of motion, degrees of freedom, classification of Kinematic pairs, Kinematic Chain, Linkage, Mechanics, Gruebler"s criterion, Four bar chain and Slider crank chain, Kinematic inversions of four-bar chain and single and double slider crank chains **(5hrs)**

Velocity Analysis: Velocity analysis using Relative velocity method and Instantaneous center method, Kennedy's theorem, Space centrode and body centrode (**4 hrs)**

Acceleration Analysis: Centripetal and tangential accelerations, Acceleration determination by graphical method using velocity polygons, Corioli's component of acceleration, Klein's construction method to find acceleration of four bar mechanism and slider crank chain mechanism. **(5 hrs**)

UNIT – II

Cams: Types of cams and followers, various motions of the follower, Construction of cam profiles, Analysis for velocities and accelerations of tangent and circular arc cams with roller and flat-faced followers. **(6 hrs)**

UNIT - III

Computer- aided analysis and Synthesis of Mechanisms: Computer-aided analysis of four-link mechanism and slider crank mechanism, Synthesis of mechanism by graphical method (function generation by Relative pole method and inversion method, Path generation and motion generation), Computer -aided Synthesis of Mechanism- Freudenstein's equation **(5 hrs)**

Lower pairs**:** Pantograph, straight-line motion mechanisms (Paucellier, Hart, Scott Russel, Grasshopper, Watt, Tchebicheff's Parallel linkages) Automobile steering gears (Davis and Ackermann), Hooke's joint (universal coupling), Double Hooke's joints. **(5 hrs)**

UNIT – IV

Friction: Types of friction, Laws of dry friction, Motion along inclined plane, Screw threads, Screw jack, Wedge, Pivots and collars, Plate and cone clutches, Antifriction bearings, friction circle and friction axis **(5 hrs)**

Belts, Ropes and Chains: Open and crossed belt drives, velocity ratio, slip, material for belts, crowning of pulleys, law of belting, types of pulleys, length of belt, ratio of belt tensions, centrifugal tension, power transmitted by belts and ropes, initial tension, creep, chain drive, chain length, classification of chains. **(5 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books/References

1. Theory of Machines by Jagdish Lal
2. Theory of Machines by R.S. Khurmi
3. Theory of Machines by S.S.Rattan
4. Theory of Machines by V.P.Singh

Course Outcomes:

CO1: Students will be able to know the common mechanisms used in machines and perform velocity and acceleration analysis of mechanisms

CO2: Student will be able to construct cam profiles and analysis their velocity and acceleration

CO3: Students will be able to do Computer-aided analysis and synthesis of mechanisms and have knowledge of lower pairs

CO4: Student will be able to know the concept of friction and friction drives such as belt rope and chain drives

MEPC206: FLUID MECHANICS (PRACTICAL)

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
0	0	2	1	24

Brief description about the course

This course is about proving hands on training to students using experiments about the physical principles of Fluid Mechanics. The course will enable students to effectively communicate ideas and concepts through written work, class discussions and laboratory reports.

List of Experiments:

1. To verify the Bernoulli's theorem.
2. To determine coefficient of discharge for an Orificemeter.
3. To determine coefficient of discharge of a venturimeter.
4. To determine the various hydraulic coefficients of an Orifice (C_d ,C_c ,C_v).
5. To calibrate a given notch.
6. To determine coefficient of discharge for a mouth piece.
7. To determine the Darcy Weisbach Coefficient of friction for flow through commercial pipes.
8. To study the effect of pipe diameter on head loss in friction
9. To determine critical Reynolds' numbers for flow through commercial pipes.
10. To study development of boundary layer over a flat plate.
11. To study the momentum characteristics of a given jet.
12. To measure the pressure distribution around a cylinder placed in the air stream and to calculate the coefficient of drag therefrom.

Course Outcomes:

CO1: Understand the principles of fluid flow using experiments
CO2: Measure the flow properties in a fluid flow such as: velocity, discharge, pressure, frictional losses etc.
CO3: Apply the principles of fluid mechanics in design.
CO4: Demonstrate the ability to prepare lab report

MEPC207: STRENGTH OF MATERIALS (P)

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
0	0	2	1	30

Brief Description about the course

This course will introduce the students to the instruments and experimental methods used in Material Testing. Therefore, the learning objectives of this course are:

- To understand the behavior of materials under different tests like hardness, impact, tensile, etc.
- To understand the basic principles of strength of materials and structural analysis.
- To understand the concept of stress and strain under different loading conditions.
- To understand the mechanics of different testing machines like Servo hydraulic UTM, Servo electric UTM, etc.

List of Experiments:

1. To study the Impact testing machine and to perform the impact tests (Izod and Charpy impact test).
2. To study the Rockwell Hardness testing machine and find the Rockwell Hardness of the given specimen.
3. To study the Vickers Hardness testing machine and find the Vickers Hardness of the given specimen.
4. To study the Brinell Hardness Testing machine and find the Brinell Hardness of the given specimen.
5. To study the Erichsen Cupping machine and find out the Erichsen value of the given specimen of Sheet Metal.
6. To study the Bending stress in a Beam Structure and to find the Bending Stress in a Beam.
7. To study the Torsion testing machine and to perform the Torsion test on a given specimen.
8. To study the Universal Testing Machine(UTM) and to perform the Tensile test.
9. To perform the Compression test on Universal Testing Machine (UTM).
10. To perform the Bending Test on Universal Testing Machine (UTM).
11. To perform Low Cycle Fatigue Test on a Servo Hydraulic Universal Testing Machine of 100kN capacity.
12. To study the constant load creep behavior of metals on a Servo Electric Universal Testing Machine of 100kN capacity.
13. To study the Strut-Testing Structure and to determine
    a. The Buckling Load of a Pinned-End Strut
    b. The effect of End Conditions on the Buckling Load.

Course outcomes:

By the end of this course:
CO1: Understand the procedure of doing different tests like hardness, compression, torsion, tension, impact, etc. in various materials.
CO2: Understand the effect of stress and strain in different types of machines/structures under different loading conditions.
CO3: Describe the behavior of materials upon normal external loads.
CO4: Predict the behavior of the material under impact conditions.
CO5: Recognize the mechanical behavior of materials.
CO6: Measure the properties of the materials such as impact strength, tensile strength, compressive strength, hardness, ductility, etc.

Evaluation criterion for NCC Cadets

Following criterion is proposed to be adopted for the evaluation of NCC cadets for the practical course of NCC/NSS/Yoga

A: Internal Evaluation (During semester):

(i) Attendance:	20 marks (for 90 % attendance full marks)
(ii) Discipline:	10 Marks
(iii) Drill performance & Body bearing:	10 marks
(iv) Participation in social activities:	10 marks
(v) Domain knowledge:	10 marks (Through oral viva)

B: End sem evaluation: (At the end of the semester)

(i) Discipline:	10 Marks
(ii) Drill performance & Body bearing:	15 marks
(iv) Domain knowledge:	15 marks (Through oral viva)

C: After end of the 6^{th} semester: Bonus marks 10 for each B & C certificate is proposed to be added in final marks subject to total marks does not exceed 100

NATIONAL CADET CORPS

INSTITUTIONAL TRAINING SYLLABUS

INTRODUCTION

1. Institutional Training being conducted in the Colleges and Schools is the principal means of training in the NCC. The aim of the training is to nurture core values, enhance awareness and give exposure to basic military skills and knowledge. Emphasis will be on practical training. Case studies, wherever possible will be used to facilitate active participation and better assimilation. Examples from India's freedom struggle and wars fought by India, post-independence, should supplement relevant subjects to generate secular and patriotic fervor. The instructors and the cadets must grasp the importance of this training and participate actively.

2. **Principles of Training:** In keeping with the changing environment, the principles of NCC Training are:
   (a) Junior Division (JD)/Junior Wing (JW) to be for two years while Senior Division (SD)/Senior Wing (SW) will be for three years.
   (b) Separate syllabi for JD/JW and SD/SW.
   (c) Modified, syllabus for professional educational institutes of repute to encourage enrolment of cadets.
   (d) Revised curriculum for training in a military environment with greater emphasis on soft skill development, awareness of social responsibilities and adventure and sports.
   (e) Uniformity in syllabus for boys and girls.
   (f) Common syllabus for all three wings to be approximately 60 to 70% and Specialised Service Syllabus training will be 30 to 40%.
   (g) Emphasis on practical training.
   (h) Conduct of periodic composite training ensuring continuity for better learning assimilation and its application.

3. Common subjects will comprise about 70% of the periods and Specilalised Service Subjects will be 30%. The breakdown of periods are as under:-

Sr. No.	Subject	No. of Periods			
		First Year	Second Year	Third Year	Total
Senior Division/Wing					
(a)	Common Subject	66	72	72	210
(b)	Specilised Subject	24	33	33	90
	Total	**90**	**105**	**105**	**300**

Junior Division/Wing

(c)	Common Subject	85	85		170
				--NA—	
(d)	Specialised Subject	35	35		70
	Total	**120**	**120**		**240**

4. In addition to this syllabus, **State Directorates** will conduct Social Service Activities in the form of rallies of any nature to carry social messages in the form of posters, street plays, placards etc.

Legend	
Abbreviation	Type
L	Lecture
D	Demonstration
DI	Discussion
P	Practice
V	Video

BLOCK SYLLABUS

COMMON SUBJECTS: SD/SW (ALL WINGS)

Sr. No.	Subject	1st Year	2nd Year	3rd Year	Total Periods
1.	The NCC	03	00	00	03
2.	National Integration and Awareness	06	06	06	18
3.	Drill	16	19	08	43
4.	Weapon Training	12	10	10	32
5.	Personality Development & Leadership	10	15	20	45
6.	Disaster Management	03	03	04	10
7.	Social Awareness & Community Development	05	05	06	16
8.	Health & Hygiene	05	04	07	16
9.	Adventure	02	06	07	15
10.	Environment Awareness and Conservation	02	02	02	06
11.	Obstacle Training	02	02	02	06
Total		**66**	**72**	**72**	**210**

BLOCK SYLLABUS
SPECIALISED SUBJECTS: SD/SW (ARMY)

Sr. No.	Subject	1st Year	2nd Year	3rd Year	Total Periods
1.	Armed Forces	04	04	02	10
2.	Map Reading	07	08	09	24
3.	Field Craft & Battle Craft	05	07	09	21
4.	Introduction to infantry Weapons & Equipment	02	04	05	11
5.	Military History	03	05	05	13
6.	Communication	03	05	03	11
Total		**24**	**33**	**33**	**90**

BLOCK SYLLABUS

SPECIALISED SUBJECTS: SD/SW (AIR)

Sr. No.	Subject	1st Year	2nd Year	3rd Year	Total Periods
1.	General Service Knowledge	02	02	02	06
2.	Air Compaigns	00	02	04	06
3.	Aircraft Recognition	00	04	00	04
4.	Modern Trends	00	00	02	02
5.	Principles of Flight	03	04	03	10
6.	Airmanship	06	02	02	10
7.	Navigation	00	03	02	05
8.	Meteorology	00	01	04	05
9.	Aero-Engines	01	04	01	06
10.	Airframes	02	02	02	06
11.	Instruments	02	03	02	07
12.	Aircraft Particulars	02	00	00	02
13.	Aeromodelling	06	06	09	21
Total		**24**	**33**	**33**	**90**

BLOCK SYLLABUS

SPECIALISED SUBJECTS: SD/SW (NAVY)

Sr. No.	Subject	1st Year	2nd Year	3rd Year	Total Periods
1.	Naval Orientation	08	06	03	17
2.	Naval Warfare and its Components	00	04	03	07
3.	Naval Communication	03	04	01	08
4.	Navigation	00	06	03	09
5.	Searmanship				
	(a) Anchor Work	01	01	00	02
	(b) Rigging	03	00	00	03
	(c) Boat Work	04	05	01	10
6.	Fire Fighting, Flodding and Damage Control	00	02	02	04
7.	Ship and Boat Modelling	02	03	14	19
8.	Search and Rescue	01	00	01	02
9.	Swimming	01	03	05	09
Total		**24**	**33**	**33**	**90**

Syllabus and Evaluation Scheme of Physical Education & Sports Compulsory for up to B.Tech 6th Semester Students

Course Code: SWNC101	L	T/P	C
Course Title: Sports	0	4	2

Course Objective

Physical Education and Sports develop confidence, contributing to academic performance and mental health. Physical activity is a great way to relieve stress, promoting positive physical and mental health and enhanced learning aptitude. The class duration of 90 minutes will be divided into 02 segments comprising of Units 1 and 2.

- First 30 minutes of the class will be an interactive session where the students will be oriented and introduced to the different aspects of Physical Education and Sports.
- In the next 60 minutes of the class every students shall practice different skills and techniques of Athletics comprising of Track and Field events or any other specific games/sports of their choice.

Syllabus

Unit 1

Introduction to Physical Education

- Meaning & definition of Physical Education
- Aims & Objectives of Physical Education

Sports awards and honours

- Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

Olympic Movement

- Ancient & Modern Olympics (Summer & Winter)
- Olympic Symbols, Ideals, Objectives & Values

Physical Fitness, Wellness & Lifestyle

- Meaning & Importance of Physical Fitness
- Components of Physical fitness
- Components of Health related fitness Meaning & Importance of Wellness, Components of wellness
- Preventing Health Threats through Lifestyle Change
- Concept of Positive Lifestyle: Importance of Balance Diet etc.

Fundamentals of Anatomy & Physiology in Physical Education and Sports

- Define Anatomy, Physiology & Its Importance
- Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)

Kinesiology, Biomechanics & Sports

- Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports
- Biomechanical principles & its application in sports. (Laws of motion, Friction, Projectile etc.)

Postures

- Meaning and Concept of Postures.
- Causes of Bad Posture.
- Advantages & disadvantages of weight training.
- Concept & advantages of Correct Posture. Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis, Corrective Measures for Postural Deformities

Training and Planning in Sports

- Meaning of Training

- Warming up and limbering down
- Skill, Technique & Style

Psychology & Sports

- Definition & Importance of Psychology in Physical Edu. & Sports
- Define & Differentiate Between Growth & Development
- Adolescent Problems & Their Management
- Emotion: Concept, Type & Controlling of emotions
- Meaning, Concept & Types of Aggressions in Sports.

Doping

- Meaning and Concept of Doping
- Prohibited Substances & Methods
- Side Effects of Prohibited Substances

Sports Medicine

- First Aid – Definition, Aims & Objectives.
- Sports injuries: Classification, Causes & Prevention and Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries

Unit-2

(Practical-Sports Specific) Each student has to compulsorily opt for one game/sport so that he/she can be assessed on their performance in the same accordingly for all the 03 years.

Each student will be given practical knowledge about the basic fundamentals of various games and sports and Athletic Events be it Track or Field thereby developing the skill.

Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball etc.

1. History of the Game/Sport.
2. Latest General Rules of the Game/Sport.
3. Specifications of Play Fields and Related Sports Equipment.
4. Important Tournaments and Venues.
5. Sports Personalities.
6. Proper Sports Gear and its Importance

REFERENCE BOOKS:

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Health and Physical Education – NCERT

Distribution of Marks: Total 100 (10+30+20+40)

1. Class Attendance / Punctuality –	10 marks
2. Active Participation Sports Related Activities - (CITIUS, RUN FOR Unity, Prabhat Pheri etc.)	30 marks
3. Viva/Subject Knowledge-	20 marks
4. Practical Exam at the end of 6th Sem (Modified Fitness Test)-	40 marks

Note – PWD Students will be exempted from taking part in physical activities and the Modified Physical Fitness Test.

Syllabus and Evaluation Scheme of Yog
Compulsory for up to B.Tech 6th Semester Students

Course Code: SWNC101	L	T/P	C
Course Title: Yoga	0	4	2

Introduction: Yog education in Institute can immensely contribute to health of children by disseminating knowledge and awareness about the value of health, inculcating and nurturing health promoting habits and life style.

Objectives of the course:

- To enable the student to have good physical and mental health.
- To improve cognitive ability.
- To improve the level of consciousness.

UNIT-I

Introduction to Yog

- Brief introduction to origin of Yog, Psychological aspects leading to origin of Yog, Hindu Mythological concepts about origin of Yog
- History and Development of Yog
- Etymology and Definitions of Yog, Aim and Objectives of Yog, Misconceptions about Yog, True Nature of Yog
- General Introduction to Schools of Yog
- Principles of Yog, Yog Practices for Health and Harmony

UNIT-II

Yog and You

- **Concept of Health-** Aahaar, Nidra, Bharmacharaya, Viyayaam.
- **Aarogya -** Prevention, Cure and Remedies.
- Life Management and Development.

UNIT-III

Yog for Health Promotion –

- Brief introduction to human body
- Role of yog for health promotion
- Yogic attitudes and practices
- Holistic approach of yog towards the health and diseases
- Introduction to yog diet and its relevance and importance in yog Sadhana
- Dincharya and Ritucharya with respect of yogic lifestyle

UNIT-IV

Yog as Preventive measure for Lifestyle Disease

- **Obesity:** Procedure, Benefits & Contraindications for Tadasana, Katichakrasana, Pavanmuktasana, Matsayasana, Halasana, Pachimottansana, Ardha – Matsyendrasana, Dhanurasana, Ushtrasana, Suryabedhan pranayama.
- **Diabetes:** Procedure, Benefits & Contraindications for Katichakrasana, Pavanmuktasana,Bhujangasana, Shalabhasana, Dhanurasana, Supta-vajarasana, Paschimottanasana, Ardha-Mastendrasana, Mandukasana, Gomukasana, Yogmudra, Ushtrasana, Kapalabhati.
- **Asthma:** Procedure, Benefits & Contraindications for Tadasana, Urdhwahastottansana, UttanMandukasana, Bhujangasana, Dhanurasana, Ushtrasana, Vakrasana, Kapalbhati, Gomukhasana Matsyaasana, Anuloma-Viloma.
- **Hypertension:** Procedure, Benefits & Contraindications for Tadasana, Katichakransan, Uttanpadasana, Ardha Halasana, Sarala Matyasana, Gomukhasana, UttanMandukasana, Vakrasana, Bhujangasana, Makarasana, Shavasana, Nadishodhanapranayam, Sitlipranayam.

UNIT-V (Yogic Practice)

1. YOGIC SUKSMA VYAYAMA

Uccharana-sthalatatha Vishudha-chakra-shuddhi (for throat and voice)
Prarthana (Prayer)
Buddhi-tatha-dhritishakti-vikasaka (for developing will power)
Smaranashakti-vikasaka (for improving the memory)
Medhashakti-vikasaka (for improving the intellect and memory)
Netrashakti-vikasaka (for the eyes)
Kapolashakti-vardhaka (for the cheeks)
Karnashakti-vardhaka (for the ears)
Grivashakti-vikasaka (for the Neck)
Grivashakti-vikasaka (for the Neck)
Grivashakti-vikasaka (for the Neck)
Skandha-tatha-bahu-mulashakti-vikasaka (for the shoulders)
Bhuja-bandhashakti-vikasaka
Kohinishakti-vikasaka
Bhuja-vallishakti-vikasaka
Purna-bhujashakti-vikasaka (for the arms)
Mani-bandhashakti-vikasaka
Kara-prsthashakti-vikasaka
Kara-talashakti-vikasaka
Anguli-mulashakti-vikasaka (for the fingers)
Anguli- shakti-vikasaka (for the fingers)
Vaksa-sthalashakti-vikasaka (for the chest)
Vaksa-sthalashakti-vikasaka (for the chest)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarasakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Udarashakti-vikasaka (for the abdomen)
Kati shakti-vikasaka (for the waist)
Kati shakti-vikasaka (for the waist)
Kati shakti-vikasaka (for the waist)
Kati shakti-vikasaka (for the waist)
Kati shakti-vikasaka (for the waist)
Muladhara-chakra-suddhi (for the rectum)
Upasthatatha-svadhisthana-chakra-suddhi (for the genital organs)
Kundalinishakti-vikasaka (for the kundalini)
Janghashakti-vikasaka (for the thighs)
Janghashakti-vikasaka (for the thighs)
Janushakti-vikasaka (for the knees)
Pindalishakti-vikasaka (for the calves)
Pada-mulashakti-vikasaka
Gulpha-pada-pristha-pada-tala-shakti-vikasaka (for the ankles and the feet)
Padangulishakti-vikasaka (for the toes)

2. YOGSANA (Sitting Postures)

Dandasana, Swastikasana, Padmasana,Vajrasana, Supta Vajrasana**,** Kagasana, Utkatasana, Gomukhasana,Ushtrasana, Shashankasana, Janusirasana, Paschimottanasana, Bhramacharyasana, Mandukasana, Utthana Mandukasana, Vakrasana, Ardha Matsyendrasana, Marichayasana, Simhasana

3. YOGSANA (Supine lying Postures)
Pavanamuktasan, Utthana-padasana, Ardha Halasana, Halasana, Setubandha Sarvangasana, Sarvangasana, Matsyasana, Chakrasana, Shavasana

4. YOGSANA (Prone lying Postures)
Makarasana, Bhujangasana, Shalabhasana, Dhanurasana, Kapotasana, Raja Kapotasana

5. PRANAYAMA (with Antar & Bahya Kumbhaka)
Surya-bhedi and Chandra-bhedi Pranayama, Ujjayi Pranayama, Sheetali Pranayama, Shitkari Pranayama, Bhastrika Pranayama

6. BANDHA
Jivha Bandha, Jalandhara Bandha, Uddiyana Bandha, Mula Bandha, Maha Bandha, Tri Bandha

7. PRACTICES LEADING TO MEDITATION
Ajapa Dharana, Yog Nidra, Practices leading to Breath Meditation, Practices leading to Om Meditation

8. YOGSANA
Siddhasana, Bhadrasana, Baddha Padmasana, Uttitha Padmasana, Bhunamanasana, Hanumanasana, Bakasana, Kukkutasana, Garbhasana, Matsyendrasana, Marjariasana, Padangusthasana, Hastapadangusthasana, Garudasana, Vatayanasana, Natarajasana, Mayurasana, Padma Mayurasana, Sirshasana and its variations, Ekapada and Dwipada Kandarasana

9. **MUDRAS**
Yog Mudra, Maha Mudra, Shanmukhi Mudra, Shambhavi Mudra, Kaki Mudra, Tadagi Mudra, Vipareet Karni Mudra, Simha Mudra

Distribution of Marks: Total 100 (10+30+20+40)

1. Class Attendance / Punctuality –	**10 marks**
2. Active Participation in Sports Related Activities -	**30 marks**
3. Viva/Subject Knowledge-	**20 marks**
4. End Semester Practical Exam (Yogic Practice)-	**40 marks**

National Service Scheme (NSS)

Course Title: NCC/NSS/Yoga | Course Code: SWNC102;

LTP: 002 | Credit: 1 (Semester 1 to 6)

Overall Objective:

Development of Student's personality through community service.

Aims & Objective of NSS:

i. To understand the community in which they work.

ii. To understand themselves in relation to their community.

iii. To identify the needs and problems of the community and involve them in a problem-solving process.

iv. To develop among themselves a sense of social and civic responsibility.

v. To utilize their knowledge in finding practical solutions to individual and community problems.

vi. To develop the competence required for group living and sharing responsibilities.

vii. To gain skills in mobilizing community participation.

viii. To acquire leadership qualities and a democratic attitude.

ix. To develop capacity to meet emergencies and natural disasters.

Joining NSS:

Simply by enrolling/registering yourself in the NSS unit through the NSS Programme Coordinator/Officer concerned.

Guidelines for Evaluating NSS Students

Curriculum's 1-credit Course (Semester 1 to 6)

For the curriculum's credit award to students under NSS, the following procedure will be adopted:

Students should engage in various NSS activities (listed in Annexure-1) for at least 240 hours in three years (minimum 40 Hrs/semester).

The attendance records of students will be maintained by their unit's respective Programme Officer.

A student who participates in different activities of NSS during the 1st to 6th semester then he/she will earn certain hours per activity depending upon his/her role and responsibilities carried out by the volunteer as per the following rules:

S.No.	Role	No. of Hours
1	Audience	Upto 5 Hours
2	Active Participation	Upto 7 Hours
3	Organizer	Upto 10 Hours

Distribution of Marks: Total 100 (20+20+20+40)

Class Attendance: 20

Discipline & Punctuality: 20

Event Knowledge: 20

Comprehensive Viva (for all activities held during the entire semester): 40

Annexure-1 (Tentative NSS Activities Planned for an Academic Year)

Activities
Vanmohotsava Week (5-7 days) (Environment Enrichment & Tree Plantation) (Nearby places like public institutions, adopted villages/slum areas, and wasteland and other such activities)
Disaster Management (Workshops, awareness camps for Relief and rescue work inoculation and immunization, distribution of medicines, essential goods)
Adopted village (visiting some nearby villages and deciding 2-3 villages to be adopted for literacy promotion and basic facilities like drinking water, pucca/kutchha road, school shed/buildings, cooperative/self-employment scheme, etc.)
Independence Day (Participation in the college celebration)
Literacy Week (Pledge-taking ceremony, Visit to adopted village/slum to organize dialogue and discussion, Putting up hoardings and banners at prominent places in the local area)
Health Service & Awareness (Integrated Child Development Programme, Health Education, HIV/AIDS Awareness Programme, Motivating parents to send children to school and other such activities)
"**Annual NSS Day Celebrations**" of NSS
Digital Transactions Awareness Programs ("Startup India – Stand up India")
Blood Donation Camp in collaboration with NITKAA
Autumn Camp (**4-6 days)** in a nearby village (Youth for Sustainable Development with a focus on Watershed Management & Wasteland Development or some other theme)
Gandhi Jayanti (Quiz competition, Speech, Communal Harmony DAY, and other such activities)
Quami Ekta Week (National Integration Day, Welfare of Minorities Day, Cultural Unity Day, Women's Day, Conservation Day)
Swachhta Pakhwada (various activities like cleanliness campaigns in campus, locality, road safety, and other such activities engaging GOI Ministries/Departments initiatives)
Legal Literacy-Social Justice (Lecture by relevant person and other activities
World AIDS Day (creating awareness among school and college-going students, organizing lectures, public discussions, film shows, rallies and street plays)
Energy Conservation Day (awareness programme and other activities
National Youth Week (Lectures/Symposia on the philosophy and teaching of Swami Vivekanand, Mahatma Gandhi; Debate on the role of youth in the contemporary situation; Essay/drawing competitions amongst youth)
Republic Day (Participation in the college celebration)

Nasha Mukti Abhiyan (Awareness on the part of Tobacco Free Society; campaigns, posters, programmes in Hostels)
Women's Week (Special programmes regarding the significant role of women and girl child; Prominent women leaders lectures; awareness programmes and other such activities)
National Safety Day/ Week (Activities based on a theme provided by National Safety Council (GOI))
Life Skills and Vocational Training Programmes (Industry professional for lectures, competitions and other such activities)
Career Guidance (For college students through prominent speakers; NSS volunteers going to schools to provide guidance to 9-12th students and other such activities)
Environment Enrichment & Climate Change (Special programmes like lectures, campaigns, posters and other such activities)
World Bicycle Day Celebration
Other Activities: Activities suggested by Institute, State NSS Unit, MHRD, GOI Ministries etc.

Guidelines for evaluation of student activities under Students Clubs
(1st to 6th Semester: 02 credit)

The Students Clubs provide facilities and the right environment to develop extra-curricular skills in the students, in addition to the academic knowledge imparted by the Institute. Twelve (12) different clubs are working under Students Clubs which organized various events (workshops, guest lecturers etc.) and competitions, to instil the spirit of healthy competition among students, throughout the year. A national level mega cultural festival under the name CONFLUENCE is organized every year. Students can earn course credit by participating in various events organised by the student's club and assisting in coordinating these events as a member of these clubs.

For the credit award to students under students club, following is recommended:

1. Students must engage in club activities for 240 hours in three years (40 hours in one semester).
2. The evaluation criterion and activity hours will be calculated as follows:

S. No	Evaluation Criterion	Number of hours credited	Distribution of Max Marks 100 (Weightage 80%)
1.	Participation as an Audience	0.5 hour* number of event hours	--
2.	Participation as an Performer	(a) 06 hours for full day activity (b) 03 hours for half day activity	10 05
3.	Prize/Award/Recognition (intra - college events)	05 hours	20
4.	Prize/Award/Recognition (inter - college events)	10 hours	30
5.	Organization of event	(a) 12 hours for full day activity (b) 06 hours for half day activity	20 10
6.	Sponsorship Note: Number of hours will be equally divided among students involved where minimum Rs. 25,000/- per students must be ensured.	(a) 15 hours for sponsorship upto 01 Lakh (b) 30 hours for sponsorship upto 05 Lakh (c) 40 hours for sponsorship more than 05 Lakh	(a) 15 (b) 30 (c) 40 Note: Marks will be divided equally in team members, if any

3. The comprehensive viva-voce (**Weightage 20%**) will be conducted at the end of every semester.
4. Documents required as proof:

a. **Participation**: A certificate of participation duly signed by the organizing club's faculty-in-charge. All clubs will maintain a record of certificates issued for verification.
b. **Prize/Reward/Recognition**: A Certificate of Merit/Letter of Appreciation duly signed by Head of the Institute/Dean (SW)/Professor-in-charge of Students Club.
c. **Organization**: A Certificate of Appreciation mentioning event's name and committee's name in which the student contributed.
d. **Sponsorship**: A letter of sponsorship from sponsoring organization mention amount and list of students involved in sponsorship effort. The amount will be equally divided among the students for award of hours and marks as per criterion 6.

Note:

1. Faculty in charges of the individual clubs must ensure at least 40 hours of activities per semester and must keep the record of number of hours for each and every student involved/ registered for clubs.
2. Further, workload of two (02) hours per week should be included as teaching load for faculty in-charges (FIC) and Professor In-charges (PIC) in order to ensure smooth conduct of activities of the clubs.
3. It is recommended to make provision for earned leave for organising events in non-working days.

Guidelines for evaluation of student activities under Technical Societies
(Semester 1st to 6th: 240 hrs.: 1 credit)

There are 12 societies/clubs currently under technical societies which conduct various events (competitions, workshops, guest lectures, meetings etc.) throughout the year and one major event TECHSPARDHA, the annual technical festival is conducted once a year. Each of this society/club is headed by a team of students usually from final year of their programme under the guidance of a faculty-in-charge.

Under new curriculum for B. Tech students, the activities of all technical societies/clubs are to be considered as an audit course. The credit for this course will be awarded at the end of 6th semester.

Students can earn course credit by participating in various events organised by the technical societies and help in coordinating these events as a member of these societies/clubs. The selected heads of societies/clubs under supervision of faculty-in-charge will ensure that each member is engaged in the activities of society/club for at least 40 hours in each semester (240 hours in 6 semesters) to fulfil the requirement of award of credits

At the end of sixth semester the evaluation of student will be carried by a committee of faculty-in-charges of the technical societies. They will be awarded points on following criterion:

Sr. No.	Criterion	Semester I and II (max 20 marks)	Semester III and IV (max 30 marks)	Semester V and VI (max 50 marks)
1.	Participation	1/event	1.5/event	2/event
2.	Prize/Award/ Recognition (intra-college events)	2/event	3/event	4/event
3.	Prize/Award/ Recognition (inter-college events)	4/event	6/event	8/event
4.	Organization	4/event	6/event	8/event
5.	Sponsorship	4/ (Rs10K worth of sponsorship individually)	6/ (Rs20K worth of sponsorship individually)	8/ (Rs40K worth of sponsorship individually)

The committee will duly verify the credentials of each candidate and award marks on above criterion. Student will be awarded a grade as per institute norms.

Documents required as proof:

e. Participation: A certificate of participation duly signed by the organizing club's faculty-in-charge. All societies/clubs to maintain a record of certificates issued for verification.
f. Prize/Reward/Recognition: A Certificate of Merit/Letter of Appreciation duly signed by Head of the Institute/Dean(R&C)/Professor-in-charge of Technical Societies.
g. Organization: A Certificate of Appreciation mentioning event's name and committee's name in which the student contributed, duly signed by the faculty-in-charge of the organizing club.
h. Sponsorship: A letter of sponsorship from sponsoring organization mention amount and list of students involved in sponsorship effort. The amount will be equally divided among the students for award of marks as per criterion 5.

Bearing in mind that the activities of clubs/societies are a part of curriculum now, following recommendation may kindly be considered:

1. Adequate space may be allocated to each society/club for conducting meeting, storing materials and equipment and keeping records.
2. Adequate staff and office space be provided to professor-in-charge (Technical Societies) keep track of purchases, maintain accounts and records and secretarial assistance.
3. An engagement of one hour per week in the load of faculty-in-charge be shown in timetable to compensate for time devoted to the activities of club/societies.

MEPC208: DYNAMICS OF MACHINES

Pre-requisite: Kinematics of Machines

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief description of the course

In this subject basics of dynamic analysis are taught. This analysis is then carried out for various machine components like engines, governors, flywheel, gyroscope, brakes etc. Following are the course objectives:

1. To equip the student with fundamental knowledge of dynamics of machines so that student can perform static and dynamic force analysis.
2. To develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.
3. Develop understanding of flywheel analysis, gyroscopic forces and governors
4. To familiarize with the type of gears, gear trains and brakes

UNIT-1

Static Forces in Mechanisms: Introduction, Static force analysis, Static equilibrium, Equilibrium of members, Force convention, free body diagram, Principle of superposition, static force analysis of Four bar mechanisms , Static forces analysis of Slider-Crank mechanism, Static force analysis of Quick Return Mechanism. **(4hrs)**

Dynamic Forces in Mechanisms: D' Alembert's principle, Equivalent offset inertia force, Dynamic force analysis of four-bar mechanism, Dynamics of reciprocating parts, Piston effort, Crank effort, Equivalent dynamical systems, and Inertia force in reciprocating engines by graphical and analytical method. **(6hrs)**

UNIT-II

Gears: Types of gears, gear terminology, condition for correct gearing, cycloidal and involutes profiles of gear teeth, pressure angle, path of contact, arc of contact, interference, undercutting, minimum number of teeth, number of pairs of teeth in contact, Helical gear and spiral gear, Expression for centre distance between two shafts connected by spiral gear or helical gear, Efficiency of spiral and helical gear, Efficiency of worm and worm gear. **(5hrs)**

Gear Trains: Train value, Limitations in design of gear trains, Types of gear trains- simple, compound, reverted, and epicyclic gear train, Solution of gear trains, sun and planet gear, bevel epicyclic gear, compound epicyclicgear, pre- selective gear box, differential of automobile, torque in gear trains. **(4hrs)**

UNIT-III

Governors: Types of governors: Watt, Porter, Proell, spring loaded centrifugal governors- Hartnell and Wilson Hartnell, Sensitiveness, Stability, Isochronism's-- Hartnell and Wilson Hartnell, Hunting, Effort and power of governor, controlling force. **(4 hrs)**

Flywheels: Turning moment (crank effort) diagrams for single cylinder and multi-cylinder engines, coefficient of fluctuation of energy, coefficient of fluctuation of speed, flywheel and its function. **(4hrs)**

Brakes and Dynamometers: Types of brakes, Block or shoe break, band brakes, band and block brakes, internal expanding shoe brake, dynamometers: absorption, transmission, and tensional. **(4 hrs)**

UNIT-IV

Balancing: Balancing and its classification, Need of balancing, Balancing of rotating weights, Balancing of reciprocating parts, balancing of I.C. engines, balancing of multi-cylinder engine: V-engines and radial engines, balancing of machines. **(5hrs)**

Gyroscope: Gyroscope, Gyroscopic couple and its effect on aircraft, naval ships during steering, pitching and rolling, Stability of an automobile (2-wheelers & 4-wheelers). **(4hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books/References

1. Theory of Machines - S.S.Rattan, Tata McGraw Hill
2. Theory of Mechanism and Machines - Jagdish Lal, Metropolitan Book Co.
3. Theory of Machines by Sadhu Singh, Pearson Publisher
4. Theory of Machines- .L. Ballaney, Khanna Publisher
5. Dynamics of Machinery by S. Balaguru, Scitech Publications

Course Outcomes

1. Students should be able to perform static and dynamic analysis of machines
2. Students should be able to perform balancing of rotating and reciprocating parts of machines
3. Students should be able to describe the working of different types of brakes, dynamometers and governors
4. Students should know different types of gears, gear terminology and understand important gear trains and their practical applications.
5. Student should be able to construct turning moment diagram and have the Knowledge of flywheels and Gyroscopic Motion

MEPC209: STRENGTH OF MATERIALS- II

Pre-requisite: Strength of Materials-I

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

This course will introduce the students to a thorough understanding of structural members and their strength, stiffness, and stability. Develop an understanding of, and the capability to, solve practical engineering problems involving stress, strain and deflection in structural members such as bars and beams under different end conditions and loading. To this end, the learning objectives of this course are:

6. To learn about fixed and continuous beams and methods to find fixing moments and end reactions.
7. To study the theory to find the stresses in curved bars.
8. To study torsion of shafts and to know the stresses and deflections of various types of springs.
9. To learn about various types of stresses in thin and thick cylinders and columns.
10. To learn about stresses developed in rotating disc.

UNIT – I

Fixed and Continuous Beams: Slope and deflection at a point using different methods of statically indeterminate beams under different loads.

Bending of Curved Bars: Stresses and deflection in curved bars such as crane hooks, rings, simple chain under load. **(10 Hrs)**

UNIT – II

Torsion: Stress and Twist developed in a circular shaft due to torque, Stresses, deflection, twist developed due to compound loading in a circular shaft.

Springs**:** Stresses and deflection in the helical spring (Close coiled and open coiled), Leaf spring, Flat spiral spring under different loading. **(10 Hrs)**

UNIT – III

Thin Cylinders and Spheres: Thin cylinders and spheres subjected to internal pressure, wire winding of thin cylinders.

Thick Cylinders: Thick cylinders, composite cylinders and spheres subjected to internal and external pressures. **(10 Hrs)**

UNIT – IV

Columns: Stresses and deflection in columns subjected to different types of loading under different end conditions

Rotating Discs: Stresses and strains in disc of uniform thickness and disc of uniform strength.

(10 Hrs)

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books / Reference

1. G H Ryder, *"Strength of Materials",* ELBS, 3rd edition, 1969
2. S S Rattan, "Strength of Materials", Tata McGraw Hill, India, 3rd Edition, 2017
3. Beer P F and Johnston (Jr) E R, *"Mechanics of Materials",* McGraw Hill Education, 7th edition, 2015.
4. Popov E P, *"Engineering Mechanics of Solids",* Prentice Hall of India, New Delhi, 2nd edition, 1999.

Course Outcomes

CO 1: Draw bending moment and shear force diagrams in fixed and continuous beams
CO 2: Determine stresses and deflections in curved bars
CO 3: Find the stresses in shafts under torsion and stresses and deflection of springs
CO 4: Differentiate thick and thin cylinders
CO 5: Find stresses in rotating discs and columns

MEPC210: FLUID MACHINES

Pre-requisite: Fluid Mechanics, Thermodynamics

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief description about the course

This course is an introduction on Fluid Machines, a subject with broad applicability and great significance across engineering disciplines. The primary focus of the course is on elucidating the fundamental principles of fluid mechanics that govern energy transfer within fluid machines. It also encompasses the description and performance analysis of various hydraulic and air machines. The course provides a well-balanced approach, covering both the physical concepts and mathematical operations, supplemented with practical examples and exercises. By the end of the course, students will possess a strong foundation in Fluid Machines, enabling them to effectively apply essential principles, laws, and relevant equations in the engineering design of machines for specific applications.

UNIT- I

Principles of Hydraulic Machines: Impact of jet on stationary and moving flat and curved plates, Force on series of vanes, Radial vanes, Jet propulsion of ships.

Hydraulic Turbines: Introduction, development of hydraulic turbines, Components of hydro-power plant, Classification of turbines, Euler's equation and degree of reaction, Losses and efficiency of turbines, Surge tank and its types.

Impulse Turbines: Pelton turbine, its components and design, Energy conversion, Condition for maximum efficiency, Governing of impulse turbines. **(10hrs)**

UNIT- II

Reaction Turbines: Francis turbine: components, working principles, draft tube, types of draft tube, design considerations, outward vs. inward flow reaction turbines, Evolution of axial flow turbines, Propeller and Kaplan turbines, Governing of reaction turbines.

Performance of Turbines: Unit quantities, specific speed, runway speed, characteristics of turbines, cavitation and its effects, cavitation parameters and Thoma's cavitation factor, Detection and prevention of cavitation. **(10 hrs)**

UNIT- III

Centrifugal Pumps: Introduction, classification & components of centrifugal pumps, Principle of working, Various heads, Energy conversion, Euler's head and its variation with vane shapes, Effect of finite number of vanes, Losses and efficiencies, Minimum starting speed, Limitation of suction lift, Net Positive Suction Head (NPSH), Multistage pumps, Priming, Specific speed and performance.

Reciprocating Pumps: Working principles, Classification, Components, Discharge, Slip, Power input, Indicator diagram, Effect of accelerating head and pipe friction, Maximum speed, Air vessels, Comparison with centrifugal pumps. **(10hrs)**

UNIT- IV

Other Hydraulic Pumps**:** Propeller pump, Jet pump, Airlift pump, Gear pump, Screw pump, Vane pump, Radial piston pump, Submersible pump, pump problems. Dimensional Analysis and Model Testing: Units and dimensions, Dimensional analysis method: Rayleigh and Buckingham methods, Dimensionless numbers, Similitude laws, Model testing of turbine and pumps.

Hydraulic Systems**:** Hydraulic accumulators, Hydraulic intensifier, Hydraulic lift, Hydraulic crane, Hydraulic coupling, Torque convertor, Hydraulic ram. Case studies/Latest developments/Sustainable technologies in Fluid Machines. **(10 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books/References:

1. Som and Biswas, Introduction to Fluid Mechanics and Machinery, Tata McGraw Hill, 3rd Edition, 2011.
2. Y. A. Cengel and J. M. Cimbala, Fluid Mechanics: Fundamentals & Applications, 2nd ed. McGraw-Hill, 2006.
3. P.N.Modi, S.M Seth, Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, 19th Edition, 2009.
4. Bansal R.K., “Fluid Mechanics and Hydraulic Machines”, 9th edition, Laxmi Publications (P)Ltd., New Delhi, 2017.

Course Outcomes:

CO1: At the end of the course student will be able to understand the working and design of various types of hydraulic turbines and pumps.
CO2: They would understand the working of various types of hydraulic machines and systems.
CO3: Evaluate the performance of turbo-machines.
CO4: Select fluid machines and other hydraulic devices for various applications.

MEPC211: PRODUCTION TECHNOLOGY-I

Pre-requisite: Engineering Practice, Manufacturing process

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course:

To introduce metal cutting and related aspects, various material removal and abrasive processes, precision measurement and related aspects.

UNIT- I

Metal Cutting: Basic tool geometry, single point tool nomenclature, Chips- various type and their characteristics, mechanism of chip formation, Theoretical and experimental determination of shear angle. Orthogonal and oblique metal cutting. Metal cutting theories, relationship of velocities, forces and power consumption, specific energy

Thermal aspects of machining: Cutting temperature and factors affecting it, cutting fluids and its types, selection of cutting fluids. **(10 hrs)**

UNIT-II

Tool Wear and Life: Tool materials, flank wear, crater wear, mechanism of tool wear, Tool life relationship, Taylor's equation of tool life, Effect of parameters on tool life

Economics of metal machining: Elements of machining cost, tooling economics, machining economics and optimization. **(10 hrs)**

UNIT- III

Milling, Drilling, Grinding and super finishing process: Introduction, Milling machines types, milling cutters, milling operations, Up milling & down milling, milling operations, Drilling process, Grinding process, Grinding wheel characteristics & specifications, lapping, honing. **(10 hrs)**

UNIT- IV

Metrology: Linear and angular measurements, sine bar, auto-collimator, comparators: mechanical, electrical, optical and pneumatic, Surface finish and its measurement, Micro and macro deviations, factors influencing surface finish and evaluation of surface finish. Limits, fits & tolerances,

Analysis of machining processes: Mechanics of machining of turning, drilling, milling, machining time calculations of above operations. **(10 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books / Reference

1. Boothroyed, G. et al., Fundamentals of Metal Cutting and Machine Tools, McGraw Hill.
2. DeGarmo, E. P., Black, J.T., and Kohser, R.A., “Materials and Processes in Manufacturing”, Prentice-Hall of India.
3. Kalpakjian, S., and Schmid, S.R., “Manufacturing Engineering and Technology”, Pearson Education.
4. Groover, M.P., “Fundamentals of Modern Manufacturing”, John Wiley & Sons.Manufacturing Science - Ghosh and Mallik, E.W. Press
5. Rao,P.N., “Manufacturing Technology”, (Vol. 2), Tata McGraw-Hill
6. Ghosh, A. and Mallik, M., “Manufacturing Science”, E.W. Press
7. Production Engineering Science- Pandey and Singh

Course Outcomes

CO 1: To understand metal cutting and related aspects
CO 2: To understand tool wear, tool life and economics of machining principles
CO 3: To understand milling, drilling, grinding, honing and lapping processes
CO 4: To understand precision measurement and related aspects as well as application of metal cutting principles to practical machining operations

MEPC212: INDUSTRIAL ENGINEERING

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief description about the course

Industrial Engineering course focuses on optimizing complex systems and processes in various industries. It combines engineering principles with business management techniques to improve overall productivity and performance. Industrial engineers analyze and evaluate various factors, and manage business/industrial systems involving people, materials, methods, and machines.

UNIT-I

Introduction to Industrial Engineering: Definition, role, and scope of industrial engineering, pioneers of scientific management, industrial engineering approach and techniques, concept of productivity principles of organization, elements of organization, types of organization. **(10 hrs)**

UNIT-II

Plant Layout and Material Handling: Site selection, types of plant layout, factors affecting layout, plant building, flexibility and expansion, functions and principle of material handling, methods, introduction to concept of palletization, unit load concept, automated guided vehicle (AGV) system. Work Study: Method study, method study techniques, work measurement techniques, time study, observed time, basic time, normal time, allowances, standard time, micro and macro motion study

(10 hrs)

UNIT III

Sales Forecasting: Introduction, objectives of sales forecasting, types of forecasting, methods of sales forecasting; collective opinion method, Delphi technique, moving average method, time series analysis, simple exponential smoothing, measurement of forecasting errors. Quality Control: introduction to statistical quality control, control charts for variables, control charts for attributes, six-sigma introduction. **(10 hrs**)

UNIT-IV

Inventory Control: Introduction, Types of Inventory, Inventory Control Importance and Functions, Inventory Costs, Factors Affecting Inventory Control, Inventory cost relationship, Inventory Control Models, ABC, VED Analysis. Advancement in Industrial Engineering: Industry 4.0, lean production, sustainable industrial practices, case studies pertains to advanced industrial practices. **(10 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books / Reference

1. Production and operations management by S.N.Chary Publication Tata Mc Graw Hill (TMH)
2. Industrial Engineering and Organization Management by S.K. Sharma & Savita Sharma Publication Kataria & sons
3. Industrial Engineering and Production management by Martland T Telsang Publication S. chand
4. Modern Production Management by Elwood S. Buffo Rakesh K. Sarin Publication John Wiley & Sons
5. Handbook of Industrial Engineering: Technology and Operations Management, by Gavriel Salvendy, publication John Wiley & Sons

Course Outcomes

CO1: Understand industrial engineering concepts to optimize the industrial resources
CO2: Use plant layout concepts to develop and expand the industrial layouts.
CO3: Apply forecasting and inventory models for smooth functioning of industry shop floors
CO4: Analyze the quality of product and services in industrial scenario with statistical concept of quality control

MEPC213: INTRODUCTION TO MATLAB PROGRAMMING

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

MATLAB is an object-oriented high-level interactive software package for scientific and engineering numerical computations. Its name stands for matrix laboratory. MAT - LAB enables easy manipulation of matrix and other computations without the need for traditional programming. MATLAB's basic data element is the matrix. In MATLAB programming, the main features of the MATLAB integrated design environment and its user interfaces - the MATLAB Desktop, Command window and the Graph Window, How to do simple and complex calculation using MATLAB. How to automate commands with scripts, How to Increase automation by encapsulating modular tasks as user-defined functions and the tools that are essential in solving engineering problems are covered

UNIT-I

Basic Features and The MATLAB Desktop: Introduction to MATLAB, MATLAB Windows, Variables, Keywords, Special variables, Managing the workspace, Complex Numbers, Number display formats, Mathematical functions, MATLAB search path, Script M-File use, Use of Special functions-disp, input, pause, waitfor buttonpress, Comments, Block comments, punctuation and aborting execution **(5 hrs)**

Arrays and Array Operations: Simple arrays, Array addressing, Array construction, array orientation,, scalar-array mathematics, array-array mathematics, standard arrays, array manipulation, array sorting, subarray searching, array manipulation functions, array size, multidimensional arrays **(5 hrs)**

UNIT-II

Numeric data types, Cell Arrays and Structures: Numeric Data types- integer data types, floating point data types, cell array creation, cell array manipulation, retrieving cell array content, cell functions, structure creation, structure manipulation, retrieving structure content, structure functions **(5 hrs)**

Relational and Logical Operations: Relational operators, logical operators, operator precedence, relational and logical functions **(5 hrs)**

UNIT-III

Control Flow: Control flow-for loops, While loops, if-Else-End, Switch-Case, Try-Catch block **(5 hrs)**

Functions: M-FILE function construction rules, input and output arguments, nested functions, Function handles and anonymous functions **(5 hrs)**

UNIT –IV

Two & Three Dimensional Graphics and Debugging: Two dimensional graphics- The plot function, Line style, Markers, Colors, plot grids, axes box and labels, Customizing plot axes, Multiple plots, Multiple figures, Subplots, Interactive plotting tools, Specialized 2D plots, Three- Dimensional graphics- Line plots, Scalar functions of two variables, Mesh plots, Surface plots, Contour plots, How to do Debugging in MATLAB, Native data files, directory management **(5 hrs)**

Matrix Algebra and Data Analysis: Set of Linear Equations, Matrix functions, Sparse Matrices, Basic Statistical Analysis, Basic Data Analysis, Data Analysis and Statistical Functions **(5 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books/References

1. Mastering MATLAB 7 BY Duane Hanselman, Bruce Lttle field
2. MATLAB Programming for Engineers by Stephen J. Chapman
3. Introduction to MATLAB for Engineers by William J. Palm III
4. A Guide to MATLAB: For Beginners and Experienced Users by Brian R. Hunt

Course Outcomes:

CO1: Students will become familiar with fundamental operations in MATLAB, matrix generation and manipulation
CO2: Students will become familiar with cell arrays, Structures , Logical and Relational Operators
CO3: Students will be able to use control loops and functions
CO4: Students will be able to use MATLAB graphic feature and apply Matrix Algebra and Data Analysis

MEPC214: THEORY OF MACHINES (P)

Pre-requisite: KOM

L	T	P	Credits	Total contact hours
-	-	2	1	24

Brief Description about the course

To prepare students for kinematic and dynamic analysis of various machines and mechanisms.

Course Contents

1. To determine experimentally the ratio of cutting to idle time to the crank & slotted lever (QRM) & Compare the result with theoretical values. Plot the following:

(i) θ v/s displacement of slider
(ii) θ v/s velocity
(iii) θ v/s acceleration

2. To determine velocity & acceleration of slider in Slider Crank mechanism and plot the following:

(i) θ v/s displacement of slider
(ii) θ v/s velocity
(iii) θ v/s acceleration Compare the values of velocities and acceleration with those obtained theoretically. Assume angular velocity = 1 rad/sec

3. To determine the values of coefficient of friction between the screw & nut of jack while:

(i) Raising the load
(ii) Lowering the load

4. To draw experimentally a curve of the follower displacement v/s cam angle. Differentiate the above curve to get velocity & acceleration plot & compare the values with those obtained analytically.
5. To determine the value of coefficient of friction between belt & pulley and plot a graph between log T_1/T_2, &θ and measure the slip and creep in belt drive.
6. To find experimentally the gyroscopic couple on motorized Gyroscope and compare with applied couple.
7. To find critical speed experimentally and to compare whirling speed of shaft with theoretical values.
8. To perform the experiment of balancing of rotating parts and find unbalanced couples and force.
9. To study various types of Gears & their terminologies – Spur, Helical, Bevel and Worm Gear. To study the various gear trains: simple, compound, reverted & epicyclic.
10. To Plot the characteristic curves for Porter, Proell and Hartnell governors. To perform the effect of varying the mass of central sleeve for Porter and Proell governors.
11. To find experimentally the Coriolli's component of acceleration and compare with theoretical values.
12. To measure Epicyclic Gear ratio between input shaft and output shaft.

Course Outcomes:

Students are able to perform the static and dynamic analysis of mechanisms.

CO1 Able to perform the experiment on various mechanisms.
CO2 To understand and illustrate various power transmission mechanisms.
CO3 Knowledge of Gyroscopic Motion, Governors, Gears and Gear Train.
CO4 Able to perform the experiment of Coriolli’s component of acceleration.

MEPC215: Fluid Machines (P)

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
-	-	2	1	24

Brief description about the course

This Course provides a simple understanding of principles of fluid flow fundamentals. The course consists of measuring pressure, discharge, velocity of fluid flow and head loss. It provides the knowledge in performance testing of Hydraulic Turbines and Hydraulic Pumps at constant speed and Head.

Course Content:

1. Determine the overall efficiency of Pelton wheel Turbine at Constant Speed and Constant Head
2. Determine the overall efficiency of Francis Turbine at Constant Speed and Constant Head.
3. Determine the overall efficiency of Kaplan Turbine at Constant Speed and Constant Head.
4. Determine the overall efficiency of Centrifugal pump at Constant Speed and Constant Head.
5. Determine the overall efficiency of Reciprocating pump at Constant Speed and Constant Head.
6. Study and perform test on a Gear pump.
7. Study and perform test on a Torque Convertor.
8. Study and perform test on a Hydraulic Ram to find out its efficiency.

Course Outcomes:

At the end of the course student will be able to

CO1 Do performance analysis of fluid machines specially turbines and pumps.

CO2 Analyze practical problems in all power plants and chemical industries

CO3 Conduct experiments (in teams) and analyze a variety of practical fluid-flow devices and utilize fluid mechanics principles in design

CO4 Optimize the pumping efficiency and select the proper pump, if provided with flow rate and pressure rise

MEPC216: PRODUCTION TECHNOLOGY-I (P)

Pre-requisite: **Engineering Practice, Manufacturing Processes**

L	T	P	Credits	Total contact hours
0	0	2	1	14

Brief Description about the course:
To provide hands on training by preparing various jobs in workshop

COURSE CONTENT:

1. To measure various angles of a single point cutting tool
2. To measure various angles of a milling cutter
3. To prepare a given job on milling machine
4. Introduction to various grinding wheels and demonstration on the cylindrical and surface grinder.
5. Introduction to tool grinder
6. introduction to tool dynamometer
7. Study of linear, angular measuring devices and to measure the linear and angular dimensions using various equipments.
8. Prepare a wooden pattern of the given item considering allowances etc.
9. Prepare a mould and do casting of the pattern (Sl. No.8) prepared above.
10. To carry out welding by electric arc welding in flat, horizontal and vertical position of given jobs

Course Outcomes:
The students will be able to measure various tool angles, carry out various operations on milling machine, observe grinding processes and carry out precision measurements in metrology lab as well as welding of jobs

References:
Handouts provided in the lab.