INSTITUTE OF ENGINNERING AND TECHNOLOGY LUCKNOW

(An Autonomous Constituent Institute of Dr. A.P.J. Abdul Kalam Technical University, Lucknow)

Scheme & Syllabus

For

B. Tech. First Year

(Mechanical Engineering)

[Effective from the Session: 2023-24]

B. Tech. First Year, Semester- I Course Structure

(All Branches effective from session 2023-24)

3- WEEKS STUDENT INDUCTION PROGRAMME in the beginning of the session													
								Evaluation Scheme					
SN	**Subject Code**	**Subject Name**	**Type**	**Category**	**Period**			**Sessional Component**		**Sessional (SW) (TS/PS)**	**End Semester Examination (ESE)**	**Total**	**Credit**
					L	**T**	**P**	**CT**	**TA**	**CT+TA**	**TE/PE**	**SW+ ESE**	**Cr**
1.	IAS101/ IAS102	Engineering Physics/ Engineering Chemistry	**T**	BS	3	1	0	20	10	**30**	**70**	**100**	**4**
2.	IAS103	Engineering Mathematics-I	**T**	BS	3	1	0	20	10	**30**	**70**	**100**	**4**
3.	IEE101/ IEC101	Fundamentals of Electrical Engineering/ Fundamentals of Electronics Engineering	**T**	ES	2	1	0	20	10	**30**	**70**	**100**	**3**
4.	ICS101/ IME101	Programming for Problem Solving/ Fundamentals of Mechanical Engineering	**T**	ES	2	1	0	20	10	**30**	**70**	**100**	**3**
5.	IAS104/ IAS105	Environment and Ecology/ Soft Skills	**T**	BS/ HS	3	0	0	20	10	**30**	**70**	**100**	**3**
6.	IAS151/ IAS152	Engineering Physics Lab/ Engineering Chemistry Lab	**P**	BS	0	0	2	-	50	**50**	**50**	**100**	**1**
7.	IEE151/ IEC151	Basic Electrical Engineering Lab/ Basic Electronics Engineering Lab	**P**	ES	0	0	2	-	50	**50**	**50**	**100**	**1**
8.	ICS151/ IAS155	Programming for Problem Solving Lab/ English Language Lab	**P**	ES/ HS	0	0	2	-	50	**50**	**50**	**100**	**1**
9.	ICE151 / IWS151	Engineering Graphics & Design Lab/ Workshop Practice Lab	**P**	ES	0	1	3	-	50	**50**	**50**	**100**	**2**
					13	**5**	**9**			**350**	**550**	**900**	**22**

Abbreviation Used:

BS: Basic Science Course
ES: Engineering Science Course
HS: Humanities and Social Science Course
VA: Value Added Course

B. Tech. First Year, Semester- II Course Structure

(All Branches effective from session 2023-24)

								Evaluation Scheme					
SN	**Subject Code**	**Subject Name**	**Type**	**Category**	**Period**			**Sessional Component**		**Sessional (SW) (TS/PS)**	**End Semester Examination (ESE)**	**Total**	**Credit**
					L	**T**	**P**	**CT**	**TA**	**CT+TA**	**TE/PE**	**SW+ ESE**	**Cr**
1.	IAS202/ IAS201	Engineering Chemistry / Engineering Physics	**T**	BS	3	1	0	20	10	**30**	**70**	**100**	**4**
2.	IAS203	Engineering Mathematics-II	**T**	BS	3	1	0	20	10	**30**	**70**	**100**	**4**
3.	IEC201/ IEE201	Fundamentals of Electronics Engineering / Fundamentals of Electrical Engineering	**T**	ES	2	1	0	20	10	**30**	**70**	**100**	**3**
4.	IME201/ ICS201	Fundamentals of Mechanical Engineering/ Programming for Problem Solving	**T**	ES	2	1	0	20	10	**30**	**70**	**100**	**3**
5.	IAS205/ IAS204	Soft Skills / Environment and Ecology	**T**	HS/ BS	3	0	0	20	10	**30**	**70**	**100**	**3**
6.	IAS252/ IAS251	Engineering Chemistry Lab / Engineering Physics Lab	**P**	BS	0	0	2	-	50	**50**	**50**	**100**	**1**
7.	IEC251/ IEE251	Basic Electronics Engineering Lab/ Basic Electrical Engineering Lab	**P**	ES	0	0	2	-	50	**50**	**50**	**100**	**1**
8.	IAS255/ ICS251	English Language Lab / Programming for Problem Solving Lab	**P**	HS/ ES	0	0	2	-	50	**50**	**50**	**100**	**1**
9.	IWS251/ ICE251	Workshop Practice Lab / Engineering Graphics & Design Lab	**P**	ES	0	1	3	-	50	**50**	**50**	**100**	**2**
					13	**5**	**9**			**350**	**550**	**900**	**22**
Value Added Course													
	IVA251/ IVA252	Sports and Yoga / NSS#	**P**	VA	0	0	2	-	100	**100**		**100**	**0**

Abbreviation Used:

BS: Basic Science Course
ES: Engineering Science Course
HS: Humanities and Social Science Course
VA: Value Added Course

Summer Internship (4-week) / NPTEL Course (4-week) during summer

Syllabus

IME-101/ IME-201	FUNDAMENTAL OF MECHANICAL ENGINEERING	2L:1T:0P	3 Credits

Unit	Topics	No. of Hours
I	**INTRODUCTION TO MECHANICS OF SOLID** Force moment and couple, principle of transmissibility, Varignon's theorem. Resultant of force system- concurrent and non-concurrent coplanar forces, Types of supports (Hinge, Roller) and loads (Point, UDL, UVL), free body diagram, equilibrium equations and Support Reactions. Normal and shear Stress, strain, Hookes' law, Poisson's ratio, elastic constants and their relationship, stress-strain diagram for ductile and brittle materials, factor of safety.	8
II	**BASICS OF THERMODYNAMICS** Introduction, microscopic and macroscopic approaches, Concept of continuum, control volume and surfaces, thermodynamic properties, path, process and cycle, thermodynamic equilibrium, Quasistatic process, Energy and its forms, work and heat, gas laws, Ideal gas, Zeroth law of thermodynamics First law of thermodynamics: Joules' experiment, Internal energy and enthalpy, PMM-I. Second law of thermodynamics: Heat engines, Efficiency, Heat pump, refrigerator, Kelvin Planck statement, Clausius statement, PMM-II.	10
III	**INTRODUCTION TO FLUID MECHANICS** Fluid's properties: pressure, density, dynamic and kinematic viscosity. Surface tension, vapor pressure, cavitation, Newtonian and Non-Newtonian fluid, Pascal's Law, continuity equation. Flow Measurement devices Simple Manometer, U-Tube manometer, Bourdon tube, Venturi meter, Pitot tube and Orifice meter	8
IV	**I.C ENGINE & ELECTRIC VEHICLES** IC Engine: basic definition of engine and components, construction and working of two stroke and four stroke SI & CI engine, merits and demerits, scavenging process; difference between two-stroke and four stroke IC engines and SI and CI Engines. Electric vehicles and hybrid vehicles: components of an EV, EV batteries, chargers, drives, transmission and power devices. Advantages and disadvantages of EVs. Hybrid electric vehicles, HEV drive train components, advantages of HV.	8
V	**INTRODUCTION TO MECHATRONICS** Introduction to Mechatronic Systems: Evolution, Scope, advantages and disadvantages, industrial applications, introduction to autotronics, bionics, and avionics and their applications. Sensors and transducers: types of sensors, types of transducers and their characteristics. Overview of mechanical, hydraulic and pneumatic actuation systems. Concept of Measurement, Error in measurements, Calibration, strain (Bonded and Unbonded Strain Gauge), temperature sensor (Thermocouple and Optical Pyrometer), force (Proving Ring) and torques (Prony Brake Dynamometer); Concepts of accuracy, precision and resolution	8

Course Outcomes:

At the end of this course, the students will be able to:

COs	Statement
CO1	Analysis of forces under different structural loading conditions and comprehend the fundamentals of stress and strain
CO2	Recognize the laws of thermodynamics and their application to thermal systems
CO3	Understand the basics of fluid mechanics to apply in flow measurement devices
CO4	Comparative analysis of the design and working of I.C. engines versus electric vehicles
CO5	Utilize mechatronics devices for real life application

Reference Books:

1. Basic Mechanical Engineering, G Shanmugam, S Ravindran, McGraw Hill
2. Basic Mechanical Engineering, M P Poonia and S C Sharma, Khanna Publishers
3. Mechatronics: Principles, Concepts and Applications, Nitaigour Mahalik, McGraw Hill
4. Mechatronics, As per AICTE: Integrated Mechanical Electronic Systems, K.P. Ramachandran, G.K. Vijayaraghavan, M.S.Balasundaram, Wiley India
5. Mechanical Measurements & Control, Dr. D. S. Kumar. Metropolitan Book Company
6. Fluid Mechanics and Hydraulic Machines, Mahesh Kumar, Pearson India

IWS-151/ IWS-251	WORKSHOP PRACTICE LAB	0L:1T:3P	2 Credit

S. No.	Contents
1	**Introduction to Mechanical workshop material, tools and machines**
	To study layout, safety measures and different engineering materials (mild steel, medium carbon steel, high carbon steel, high speed steel and cast ironetc.) used in workshop.
	To study and use of different types of tools, equipment, devices & machinesused in fitting, sheet metal and welding section.
	To determine the least count of vernier caliper, vernier height gauge, micrometer (Screw gauge) and take different reading over given metallicpieces using these instruments.
2	**Machine shop**
	Demonstration of working, construction and accessories for Lathe machine
	Perform operations on Lathe - Facing, Plane Turning, step turning, taper turning, threading, knurling and parting.
3	**Fitting shop**
	Practice marking operations. Preparation of U or V -Shape Male Female Work piece which contains:Filing, Sawing, Drilling, Grinding.
4	**Carpentry Shop**
	Study of Carpentry Tools, Equipment and different joints.
	Making of Cross Half lap joint, Half lap Dovetail joint and Mortise TenonJoint
5	**Welding Shop**
	Introduction to BI standards and reading of welding drawings. Practice of Making following operations Butt Joint Lap Joint TIG Welding MIG Welding
6	**Moulding and Casting Shop**
	Introduction to Patterns, pattern allowances, ingredients of moulding sand and melting furnaces. Foundry tools and their purposes Demo of mould preparation and Aluminum castingPractice – Study and Preparation of Plastic mould

7	**CNC Shop**
	Study of main features and working parts of CNC machine and accessoriesthat can be used. Perform different operations on metal components using any CNC machines
8	**To prepare a product using 3D printing**

Course Outcomes:

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

COs	Statement
CO1	Use various engineering materials, tools, machines and measuring equipment.
CO2	Perform machine operations in lathe and CNC machine.
CO3	Perform manufacturing operations on components in fitting and carpentryshop.
CO4	Perform operations in welding, moulding, casting and gas cutting.
CO5	Fabricate a job by 3D printing manufacturing technique

Reference Books:

1. Workshop Practice, H S Bawa, McGraw Hill
2. Mechanical Workshop Practice, K C John, PHI
3. Workshop Practice Vol 1, and Vol 2, by Hazra Choudhary, Media promoters and Publications
4. CNC Fundamentals and Programming, By P. M. Agrawal, V. J. Patel, Charotar Publication.