



Dr Ambedkar Institute of Technology, Bengaluru
Department of Mechanical Engineering
LESSON PLAN-WORK ABSTRACT

Subject	Elements of Mechanical Engineering
Code	21MET105
Credit	4
Hrs/Week	4/Week

Faculty	Rajesh Chandra C
Class	J Section
Sem	1 st Semester
AY	2021 - 2022

T/L Method	1 Lecturing(L)	2 Tutorial(T)	3 Discussion/Interaction(D)	4 Audio-Visual (AV)	5 Quiz(Q)
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Class No	Unit No	Planned Topics	T/L Method Followed	Date	Duration	Portion covered /Partially covered	Remarks
01	01	Introduction to Mechanical Engineering (Overview only): Role of Mechanical Engineering in Industries and Society	L	27.12.21	1	INTRODUCTION TO MECHANICAL ENGG	
02	01	Sources of energy: Classification, renewable and non-renewable sources of energy and comparison.	L	29.12.21	1	SOURCES OF ENERGY	
03	01	Steam: Steam formation at a constant pressure: properties of steam, simple numerical problems to understand the use of steam tables. Applications of steam in industries.	L	29.12.21	1	FORMATION & APPLICATIONS OF STEAM	
04	01	Power generating systems: Introduction, construction and working of: Steam turbines – Impulse	L	31.12.21	1	STEAM TURBINES – IMPULSE	
05	01	Steam turbines - reaction turbine,	L	01.01.22	1	STEAM TURBINES – REACTION	
06	01	Gas turbines – Open and closed cycle	L	03.01.22	1	GAS TURBINES.	
07	01	Hydraulic turbines – Pelton wheel, Francis and Kaplan turbine	L	05.01.22	1	WATER TURBINES.	
08	01	Power absorbing systems: Introduction, classification of pumps and compressors.	L	05.01.22	1	PUMPS & COMPRESSORS	
09	02	Internal combustion engines: Introduction, classification, parts and terminology of IC engines	L	07.01.22	1	I.C. ENGINES	
10	02	working of 4-stroke petrol & diesel engines,	L	08.01.22	1	4-STROKE IC ENGINE	
11	02	simple numerical problems on four stroke engines. Applications of IC engines.	L	10.01.22	1	NUMERICALS	
12	02	Hybrid and Electrical vehicles: hybrid vehicles.	L	12.01.22	1	HYBRID & ELECTRIC VEHICLES	

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Class No	Unit No	Planned Topics	T/L Method Followed	Date	Duration	Portion covered /Partially covered	Remarks
13	02	Refrigeration and Air conditioning- Introduction, definition and unit of refrigeration. Refrigerants and their properties.	AV	12.01.22	1	REFRIGERATION	
14	02	Types of refrigeration systems- Vapour absorption and Vapour compression refrigeration systems and their comparison.	AV	17.01.22	1	VAPOUR ABSORPTION + VAPOUR COMPRESSION SYSTEMS.	
15	02	Principle & working of room air conditioner. Applications of Refrigerators and Air conditioning system.	AV	19.01.22	1	ROOM AIR CONDITIONER	
16	02	Laboratory Component: Demo of IC Engines, Refrigerator	L	19.01.22	2	DEMONSTRATIONS	
17	03	Engineering Materials: Types and applications of ferrous, nonferrous metals and alloys.	L	21.01.22	1	ENGINEERING MATERIALS	
18	03	Composite Materials: Introduction, classification and applications.	L	24.01.22	1	COMPOSITES	
19	03	Heat treatment: Introduction to heat treatment, Types of Heat Treatment: Annealing, quenching, carburizing, and hardening.	L	28.01.22	1	HEAT TREATMENT	
20	03	Metal Joining Processes:	L	29.01.22	1	METAL JOINING	
21	03	Soldering and brazing: Definition, types, advantages, limitations and applications of soldering and brazing. Working principle of soldering iron and torch brazing methods.	L	31.01.22	1	SOLDERING & BRAZING	
22	03	Welding: Introduction, classification and applications of welding. Working principle of electric arc welding and oxy-acetylene gas welding. Introduction to TIG and MIG welding.	L	02.02.22	1	WELDING, TIG & MIG WELDING	
23	03	Laboratory Component: One exercise each involving Welding, Soldering, and Brazing	L	04.02.22	1	DEMONSTRATIONS	
24	03	Laboratory Component: Demonstration of Heat transfer application device	L	11.02.22	1	DEMONSTRATIONS	
25	04	Belt drives - Introduction, types of belts and belt drive. Terminology - velocity ratio, creep and slip.	L	18.02.22	1	BELT DRIVES.	
26	04		L	21.02.22	1	NUMERICALS	

Class No	Unit No	Planned Topics	T/L Method Followed	Date	Duration	Portion covered /Partially covered	Remarks
27	04	Gear drives - Introduction, classification; Gear trains - types of gear train. Simple numerical problems on gear drives.	L	21.02.22	1	GEAR DRIVES & GEAR TRAINS	
28	04	Problems	L	25.02.22	1	NUMERICALS	
29	04	Robotics: Robot anatomy, Joints & links, common Robot configurations.	L	04.03.22	1	ROBOTICS	
30	04	Applications of Robotics in Material Handling, Processing, Assembly, and Inspection.	L	04.03.22	1	APPLICATION OF ROBOTICS	
31	04	Laboratory Components - Demonstration of various elementary mechanisms and their motion.	L	07.03.22	2	DEMONSTRATIONS	
32	04	Laboratory Components - Demonstration of any one model of Robot	L	14.03.22	1	DEMONSTRATIONS	
33	04	Manufacturing process: Introduction and classification of manufacturing process.	L	14.03.22	1	MANUFACTURING PROCESS	
34	04	Machine tools: Lathe -Working principle and specification of center lathe. Sketch and description of operations performed - turning, facing, knurling, thread cutting, drilling, taper turning.	L	15.03.22	1	LATHE & OPERATIONS PERFORMED ON A LATHE	
35	04	Construction and Working of Milling Machines and applications.	L	16.03.22	1	MILLING MACHINES	
36	04	Introduction to Mechatronics: Concept of open-loop and closed-loop systems,	L	16.03.22	1	MECHATRONICS	
37	04	Examples of Mechatronic systems and their working principle.	L	28.03.22	1	WORKING PRINCIPLE	
38	04	Rapid prototyping (3D printing) - Definition, Classifications, Advantages, Disadvantages, Applications, Brief introduction of 3D Printers -SLA, SLS, FDM.	L	28.03.22	1	RAPID PROTOTYPING, 3D-PRINTING	
39	05	Laboratory Components: Demonstration of developing one model involving Lathe, Milling and Drilling	L	04.04.22	1	DEMONSTRATIONS	
40	05	Laboratory Components: Study/Visit an Industry using CNC/ modern techniques and submit a report	L	04.04.22	2	DEMONSTRATIONS	



Dr Ambedkar Institute of Technology, Bengaluru
Department of Mechanical Engineering
LESSON PLAN-WORK ABSTRACT

Subject	HEAT TRANSFER
Code	18ME62
Credit	4
Hrs/Week	5/Week

Faculty	ARAVINDA D
Class	C Section
Sem	5th Semester
AY	2020 -2021

T/L Method	1 Lecturing(L)	2 Tutorial(T)	3 Discussion/Interaction(D)	4 Audio-Visual(AV)	5 Quiz(Q)
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Class No	Unit No	Planned Topics	T/L Method Followed	Date	Duration	Portion covered /Partially covered	Remarks
UNIT NO 01[9L +4T]: BASIC CONCEPTS AND CONDUCTION HEAT TRANSFER							
01	01	Introduction to the subject, Discussion on syllabus coverage, Text books, reference books, Assignment, Question paper pattern of CIE, SEE, e-resources. Introduction - Modes of heat transfer, Basic laws, Combined heat transfer mechanism	L	01/04	1	fully covered	
02	01	Resistance concept, Boundary conditions of 1 st , 2 nd and 3 rd kind; Thermal contact resistance	L	05/04	1	fully covered	
03	01	Overall heat transfer coefficient; Illustrations of applying the boundary conditions to heat transfer problems	L	06/04	1	fully covered	
04	01	Derivation of general equation of heat conduction in Cartesian coordinates; Special cases	L	06/04	1	fully covered	
05	01	Discussion on 3-D conduction in cylindrical and spherical coordinate systems (No derivation)	L	07/04	1	fully covered	
06	01	Steady state heat conduction in simple and composite slabs, cylinders and spheres (uniform thermal conductivity and without heat generation)	L	08/04	1	fully covered	
07	01	Numerical problems	T	09/04	1	fully covered	
08	01	Numerical problems	T	10/04	1	fully covered	
09	01	Numerical problems	T	12/04	1	fully covered	
10	01	Numerical problems	T	15/04	1	fully covered	

11	01	Introduction to variable thermal conductivity and heat generation;	L	$\frac{16}{04}$	1	Fully covered
12	01	Concept and derivation of critical thickness of insulation in cylinders	L	$\frac{16}{04}$	1	Fully covered
13	01	And spheres. (No numerical problems on variable thermal conductivity, heat generation and critical thickness)	L	$\frac{17}{04}$	1	Fully covered

UNIT NO 02 [9L +4T]: EXTENDED SURFACES AND ONE-DIMENSIONAL UNSTEADY CONDUCTION HEAT TRANSFER

14	02	Introduction to extended surfaces;	L	19/04	1	Fully covered
15	02	Derivation of heat transfer and temperature distribution in fins (uniform cross-section without heat generation);	L	$\frac{20}{04}$	1	Fully covered
16	02	Long fin, short fin with insulated tip and without insulated tip and fin connected between two heat sources;	L	$\frac{21}{04}$	1	Fully covered
17	02	Fin efficiency and effectiveness;	L	21/04	1	Fully covered
18	02	Related numerical problems	L	$\frac{22}{04}$	1	Fully covered
19	02	Related numerical problems	T	23/04	1	Fully covered
20	02	Related numerical problems	T	24/04	1	Fully covered
21	02	Related numerical problems	T		1	Fully covered
22	02	Introduction		26/04	1	Fully covered
22a	02	Conduction in solids with negligible internal temperature gradient (Lumped system analysis)	L	$\frac{26}{04}$	1	Fully covered
23	02	Use of Transient temperature charts (Heisler's charts) for transient conduction in slab, long cylinder and sphere	L	$\frac{27}{04}$	1	Fully covered
24	02	Use of Transient temperature charts (Heisler's charts) for transient conduction in slab, long cylinder and sphere(continued)	L	$\frac{27}{04}$	1	Fully covered
25	02	Use of Transient temperature charts (Heisler's charts) for transient conduction in slab, long cylinder and sphere(continued)	L	$\frac{28}{04}$	1	Fully covered
24b	02	Use of transient temperature charts for transient conduction in semi-infinite solids.	L	$\frac{29}{04}$	1	Fully covered

25	02	Related Numericals.	L		1	fully covered
26	02	Related Numericals.	T	29/04	1	fully covered

UNIT NO 03[9L +4T]: CONVECTION HEAT TRANSFER

27	03	Introduction – Boundary layer concept in external and internal flow	L	30/04	1	fully covered
28	03	Forced convection - Dimensional analysis for forced convection;	L	03/05	1	fully covered
29	03	physical significance of Reynolds, Prandtl, Nusselt and Stanton numbers	L	04/05	1	fully covered
30	03	Use of correlations for flow over simple geometries (flat plate, cylinder and sphere) Use of correlations for flow inside a duct.	L	04/05	1	fully covered
31	03	Free or natural convection - Dimensional analysis for free convection	L	05/05	1	fully covered
32	03	Physical significance of Grashof number; use of correlations of free convection over flat plates (vertical, horizontal and inclined),	L	06/05	1	fully covered
33	03	cylinders (vertical and horizontal) and spheres	L	07/05	1	fully covered
34	03	Related Numericals	T	08/05	1	fully covered
35	03	Related Numericals.	T	08/05	1	fully covered
36	03	Related Numericals	T	15/05	1	fully covered
37	03	Introduction to boiling: pool boiling, Bubble Growth Mechanisms	L	17/05	1	fully covered
38	03	, Nucleate Pool Boiling, Critical Heat Flux in Nucleate Pool Boiling, Pool Film Boiling,	L	18/05	1	fully covered
39	03	Critical Heat Flux, Heat Transfer beyond the Critical Point, film wise and drop wise Condensation (No numerical problems on boiling and condensation)	L	19/05	1	fully covered

UNIT NO 04[9L +4T]: HEAT EXCHANGERS

40	04	Introduction	L	20/05	1	fully covered
41	04	Classification of heat exchangers	L	20/05	1	fully covered.

42	04	Compact, Shell-and-tube and Plate heat exchangers Overall heat transfer coefficient and fouling factor	L	$\frac{21}{05}$	1	Fully covered	
43	04	Parallel and counter flow heat exchangers	L	$\frac{22}{05}$	1	Fully covered	
44	04	Use of LMTD; Cross flow heat exchangers; Comparison of parallel and counter flow heat exchangers	L	$\frac{24}{05}$	1	Fully covered	
45	04	Heat transfer with phase change; Multi pass heat exchangers	L	$\frac{25}{05}$	1	Fully covered	
46	04	Effectiveness-NTU method; Limiting cases	L	$\frac{26}{05}$	1	Fully covered	
47	04	Heat transfer enhancement in fins; Related numerical problems;.	L	$\frac{26}{05}$	1	Fully covered	
48	04	Heat pipes - Introduction; Working principle; components; Applications; Limitations	L	$\frac{28}{05}$	1	Fully covered	
49	04	Related Numericals.	T	$\frac{28}{05}$	1	Fully covered	
50	04	Related Numericals.	T	$\frac{28}{05}$	1	Fully covered	
51	04	Related Numericals.	T	$\frac{29}{05}$	1	Fully covered	
52	04	Related Numericals.	T	$\frac{29}{06}$	1	Fully covered	

UNIT NO 05[9L +4T]: RADIATION HEAT TRANSFER

53	05	Introduction; Fundamental principles - Gray, White, Opaque,	L	$\frac{05}{06}$	1	Fully covered	
54	05	Transparent and Black bodies, Spectral emissive power, Wien's displacement law, Planck's laws,	L	$\frac{07}{06}$	1	Fully covered	
55	05	Hemispherical Emissive Power, Stefan-Boltzmann law for the total emissive power of a black body, Emissivity and Kirchhoff's Laws;	L	$\frac{08}{06}$	1	Fully covered	
56	05	Black bodies separated by a non-absorbing medium; Shape factor; Electrical analogy;	L	$\frac{09}{06}$	1	Fully covered	
57	05	Two black surfaces connected by non-conducting and re-radiating walls;	L	$\frac{10}{06}$	1	Fully covered	

58	05	Evaluation of shape factor; Radiation heat transfer between gray bodies;	L	11/06	1	fully covered	
59	05	Radiosity and Irradiation; Radiation network for gray surfaces exchanging energy;	L	12/06	1	fully covered	
60	05	Hottel's crossed string method;	L	14/06	1	fully covered	
61	05	Radiation shields;	L	15/06	1	fully covered	
62	05	Related numerical problems	T	16/06	1	fully covered	
63	05	Related numerical problems	T	18/06	1	fully covered	
64	05	Related numerical problems	T	18/06	1	fully covered	
65	05	Related numerical problems	T	19/06	1	fully covered.	

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HOD
Department of Mechanical Engineering
Dr. Ambedkar Institute of Technology
Bengaluru - 560 056.

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Signature of Course Faculty



Dr Ambedkar Institute of Technology, Bengaluru
Department of Mechanical Engineering
LESSON PLAN-WORK ABSTRACT

Subject	Dynamics of Machines
Code	18ME52
Credit	3
Hrs/Week	4/Week

Faculty	Rajesh Chandra C
Class	C Section
Sem	5 th Semester
AY	2021 - 2022

T/L Method	1 Lecturing(L)	2 Tutorial(T)	3 Discussion/Interaction(D)	4 Audio-Visual (AV)	5 Quiz(Q)
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Class No	Unit No	Planned Topics	T/L Method Followed	Date	Duration	Portion covered /Partially covered	Remarks
01	01	STATIC FORCE ANALYSIS: Introduction, Static equilibrium	L	25.10.21	1	STATIC FORCE ANALYSIS	
02	01	Equilibrium of two and three force members	L	26.10.21	1	EQUILIBRIUM OF 2&3 FORCE	
03	01	Members with two forces and torque	L	27.10.21	1	MEMBERS WITH 2 FORCES	
04	01	Free body diagrams	L	27.10.21	1	FREE BODY DIAGRAMS	
05	01	Static force analysis of simple mechanisms	L	02.11.21	1	SIMPLE MECHANISM ANALYSIS	
06	01	Numericals	L	08.11.21	1	NUMERICALS.	
07	01	Numericals	L	09.11.21	1	NUMERICALS	
08	01	Principle of virtual work	L	10.11.21	1	PRINCIPLE OF VIRTUAL WORK	
09	02	Dynamic Force Analysis	L	15.11.21	1	DYNAMIC FORCE ANALYSIS	
10	02	Motion and Inertia	L	16.11.21	1	MOTION & INERTIA.	
11	02	D'Alembert's Principle	L	16.11.21	1	D'ALEMBERT'S PRINCIPLE	
12	02	Inertia force and Inertia Torque	L	17.11.21	1	INERTIA FORCE & TORQUE	
13	02	Inertia Forces in four bar mechanism	L	17.11.21	1	INERTIA FORCES IN 4 BAR	
14	02	Numericals	L	18.11.21	1	NUMERICALS	
15	02	Numericals	L	18.11.21	1	NUMERICALS	
16	03	FRICITION AND BELT DRIVES: Definitions: Types of friction, Co-efficient of friction,	L	19.11.21	1	TYPES & CO-EFFICIENT OF FRICTION	
17	03	Friction between lubricated and unlubricated surfaces, Laws of static and Kinetic friction,	L	19.11.21	1	LUBRICATED & UNLUBRICATED SURFACES	
18	03	Friction of Pivot & Conical bearings	L	20.11.21	1	PIVOT & CONICAL BEARINGS	

Class No	Unit No	Planned Topics	T/L Method Followed	Date	Duration	Portion covered /Partially covered	Remarks
19	03	Numericals	L	22.11.21	1	NUMERICALS	
20	03	Belt Drives: Initial Tension in the belt, ratio of belt tensions,	L	23.11.21	1	BELT DRIVES	
21	03	Effect of centrifugal tension, Power Transmitted by belt, thickness and width calculations	L	29.11.21	1	CENTRIFUGAL TENSION POWER TRANSMITTED.	
22	03	V- Belts, Rope Drives	L	30.11.21	1	V-BELTS, ROPE DRIVES	
23	03	Numericals	L	01.12.21	1	NUMERICALS	
24	04	BALANCING OF ROTATING MASSES: Static and dynamic balancing.	L	06.12.21	1	STATIC & DYNAMIC BALANCING	
25	04	Balancing of single rotating mass in same plane and in different planes	L	07.12.21	1	SINGLE ROTATING MASS - 2 COND.	
26	04	Numericals.	L	08.12.21	1	NUMERICALS	
27	04	Balancing of several rotating masses in same plane and in different planes	L	13.12.21	1	SEVERAL ROTATING MASSES - 2 COND	
28	04	Numericals.	L	14.12.21	1	NUMERICALS	
29	04	BALANCING OF RECIPROCATING MASSES: Inertia effect of crank and connecting rod, single cylinder engine	L	04.01.22	1	BALANCING OF RECIPROCATING MASSES	
30	04	balancing in multi cylinder- inline engine (primary & secondary forces)	L	05.01.22	1	BALANCING OF MULTI-CYLINDER ENGI	
31	04	V-type engine - Numericals.	L	06.01.22	1	V-TYPE ENGINES.	
32	05	GOVERNORS: Types of governors;	L	10.01.22	1	TYPES OF GOVERNORS	
33	05	Force analysis of Porter Hartnell governors	L	11.01.22	1	PORTER/HARTNELL GOVERNORS	
34	05	Controlling force, stability, sensitiveness	L	12.01.22	1	CONTROLLING FORCE STABILITY	
35	05	Isochronism, effort and power - Numericals.	L	13.01.22	1	ISOCHRONISM, EFFORT - NUMERICALS	
36	05	GYROSCOPES: Vectorial representation of angular motion	L	18.01.22	1	GYROSCOPES	
37	05	Gyroscopic couple. Effect of gyroscopic couple on the movement of plane disc & aero plane	L	19.01.22	1	GYROSCOPIC COUPLE ON PLANE DISC & AEROPLANE	
38	05	Stability of two-wheeler and four-wheeler taking a turn	L	20.01.22	1	STABILITY OF 2-2 4 WHEELER.	
39	05	Numericals.	L	25.01.22	1	NUMERICALS.	