Faculty of Engineering & Technology, SRM University, Kattankulathur – 603203
School of Mechanical Engineering
Department of Mechanical Engineering
Course plan

Course code : ME1002 Date : 19th December 2013
Course title : ENGINEERING MECHANICS
Semester : 2
Academic year / : 2013-'14 / Even
Semester :(December 2013-April 2014)

Section details:

Section	Room No.	Details of Faculty member				
		Name	Room No.	Intercom No.	e-mail id (@ktr.srmuniv.ac.in)	Student contact time
A	UB 601	Mr.R.Santhanakrishnan	MEA201	1829	jeyakarthik.p	Wednesday(12:15-1:30 p.m)
B	UB602	Mr.M.Sermaraj	MEB305	1803	sermaraj.m	
C	UB603	Mr.C.Subramanian	MEH101/A	1810	subramanian.c	
D	UB604	Mr.P.V.Jeyakarthikeyan	MEH101/D	1818	santhanakrishnan.r	
E	UB605	Mr.K.Ramesh	MEH101/C	1818	vamsikrishna.d	
F	UB606	Mr.Vamsi Krishna Dommeti	MEB305/A	1803	ramesh.k	
G	UB607	Mr.Shubrajit Bhaumik	MEM12/D	1827	shubrajit.b	
H	UB608	Mr.Narasima rao	H312	-	narasimharao.p	
I	UB609	Mr.S.Kolli Balasivarama	MEH109	-	balasivarama.s	
J	UB610	Mr.N.Arun	MEH109	-	arun.n	
K	UB611	Mr.K.Jagadeesan	MEB404	1803	jegadeesan.k	
L	UB612	Mr.G.Balasiva Krishna	MEH109	-	balasivakrishna.g	

Direct assessment details:

Name of assessment	Marks	Topics(Tentiative)	Tentative date	Duration
Cycle test - I	10	Statics of particles and analysis of trusses and friction	08-02-2014	100 minutes
Surprise test	05	Properties of surfaces and volume.	Before March 2014	10 – 15 min
Cycle test - II	10	Properties of surfaces and volume and dynamics of particles	10-03-2014	100 minutes
Model examination	20	Entire Syllabus	21-04-2014	3 hours
End semester examination	50	Entire Syllabus	12-05-2014	3 hours
Attendance	05	N/A		

		L	T	P	C
ME1002	ENGINEERING MECHANICS	3	2	0	4
	Prerequisite				
	Nil				

Student outcomes	Program Educational Objectives			
	1. Apply / improve their knowledge in basic sciences for excelling in various disciplines of Mechanical Engineering with the emphasis on Design, Thermal and Manufacturing.	2. Enhance professional practice to meet the global standards with ethical and social responsibility.	3. Solve industrial, social, and environmental problems with modern engineering tools.	4. Develop skills to work in teams, think intellectually and pursue life-long learning.
(a) an ability to apply knowledge of mathematics, science, and engineering	X			
(e) an ability to identify, formulate, and solve engineering problems	X		X	

Course designed by		Department of Mechanical Engineering										
1	Student outcome	a	b	c	D	e	f	g	h	i	j	K
		×				×						

2	Category	GENERAL (G)	BASIC SCIENCES (B)	ENGINEERING SCIENCES AND TECHNICAL ART (E)	PROFESSIONAL SUBJECTS (P)
			x		

3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing	Design	Thermal	Genaral		
			x				
4	Course Coordinator	Mr.R.Santhanakrishnan					

ME1002	ENGINEERING MECHANICS	L	T	P	C
	Total Contact Hours - 75	**3**	**2**	**0**	**4**
	Prerequisite				
	Nil				

Purpose

To develop the ability, in the engineering student, to understand, formulate, and solve a given problem in a logical manner and to apply it to solve a few basic problems in engineering mechanics.

INSTRUCTIONAL OBJECTIVES

1	Static equilibrium of particles and rigid bodies
2	Analysis of trusses and friction.
3	Properties of surfaces and volumes.
4	Dynamic equilibrium of particles.
5	Dynamic equilibrium of rigid bodies.

UNIT I - STATICS OF PARTICLES (16 hours)

Equilibrium of Particles: Fundamental concepts and principles of engineering mechanics - Forces on particles –vector addition- Concurrent forces in a plane -Resolution of forces - Resultant of several concurrent forces - Free body diagram–Forces in space. **Equilibrium of rigid bodies**: Principles of transmissibility -Moment of a force - Varignon's theorem - Equivalent system of forces - Reductionofsystem of forces into single force and couple-Equipollent system of forces -Types of supports and corresponding reactions - Equilibrium of rigid bodies intwo dimensions.- Equilibrium of a two force body , statically determinate andindeterminate structures.

UNIT II - ANALYSIS OF TRUSSES AND FRICTION (15 hours)

Trusses: Definition of a truss - Simple Trusses - Analysis of Trusses - Method ofjoints- Method of sections. **Friction**: Laws of Friction - Angle of Friction –Dryfriction- Wedges - Rolling friction - Belt Friction - Thrust and Journal bearings.

UNIT III - PROPERTIES OF SURFACES AND VOLUMES (14 hours)

Centre of Gravity: - Centroids of lines, areas, and volumes –Determination of centroids by integration - Theorem of Pappus-Guldinus - **Moment of Inertia**:Second moment or Moment of inertia of an area- Determination of moment of inertia of area by integration - Radius of gyration - Parallel and perpendicular axis theorems - Polar moment of inertia - Mass moment of inertia.

UNIT IV - DYNAMICS OF PARTICLES (15 hours)

Rectilinear motion –uniform velocity and uniformly accelerated motion- Rectangular components of velocity and acceleration- Curvilinear motion –Normal and tangential components- Radial and transverse components-Newton second law – D'Alembert's principle- Principle of work and energy –Applications-

Conservative forces-Principle of impulse and momentum - Impulsive motion - Impact of elastic bodies – Direct central- Oblique central impact.

UNIT V - DYNAMICS OF RIGID BODIES (15 hours)

Introduction to Kinematics of rigid bodies - Translation and rotation of rigid bodies- Fixed axis rotation – General plane motion – Absolute and Relative velocity in plane motion - Instantaneous center of rotation in plane motion - Principle of work and energy for a rigid body - Principle of impulse and momentum for the plane motion of a rigid body.

TOTAL 75

TEXTBOOKS

1. Ferdinand.P. Beer. E, Russell Johnston Jr., David Mazurek, Philip J Cornwell,*"Vector Mechanics for Engineers: Statics and Dynamics"* , McGraw - Hill,New Delhi, Tenth Edition, 2013.

2. Palanichamy.M.S, and Nagan.S, *"Engineering Mechanics (Statics and Dynamics)"*, Tata McGraw Hill, New Delhi Eighth reprint, 2011(Third edition).

REFERENCES

1. Timoshenko, and Young, *"Engineering Mechanics"*, Tata Mc-Graw Hill Book Company, Edition 4, New Delhi, 1988.

2. Mclean, and Nelson, *"Theory and problems of Engineering Mechanics(Statics and Dynamics)"*, 3rd Edition Schaum Series, 1980.

3. Rajasekaran.S, & Sankarasubramanian.G, *"Engineering Mechanics"*, VikasPublishing House Pvt Ltd, 2011.

4. Shames.I.H, and Krishna Mohana Rao.G, *"Engineering Mechanics (Statics and Dynamics)"*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education),2006.

5. Dr.Bansal.R.K, & Sanjay Bansal, *"A Text book of Engineering Mechanics"*, Lakshimi publications, Edition 7, 2011.

LESSON PLAN

Session No	Title / Details of the chapter	References
	Statics of Particles	
1	Equilibrium of Particles: Fundamental concepts and principles of engineering mechanics– Laws of mechanics.	T1 , ch 1 & ch 2
2	Problems on Equilibrium of Particles	T1 , ch 2
3	Forces on particles – Concurrent forces in a plane – Coplanar forces –Vector approach on addition ,subtraction of forces.	T1 , ch 2
4	Resolution of forces – Resultant of several concurrent forces – problems	T1 , ch 2
5	Problems on several concurrent forces (Vector approach)	T1 , ch 2
6	Free body diagram – Forces in planes.	T1 , ch 2
7	Problems on Forces in planes	T1 , ch 2
8	Forces in space –vector approach - Problems	T1 , ch 2
9	Problems on forces in space	T1 , ch 2
10	Problems on forces in space	T1 , ch 2
11	Equilibrium of rigid bodies: Principle of transmissibility – Moment of a force – Varignon's	T1 , ch 3
12	Equivalent system of forces – Reduction of system of forces into single force and couple-	T1 , ch 3
13	Types of loads-Types of supports and their reactions –Rollers, cable and hinge.	T1 , ch 4
14	Equilibrium of rigid bodies in two dimensions.- Equilibrium of a two force body	T1 , ch 4
15	Tutorial Hour: Problems on supports and reactions on beams	T1 , ch 4
	Analysis of Trusses and Friction	
16	Trusses: Simple Trusses – Analysis of Trusses - Method of joints	T1 , ch 6
17	Problems on Analysis of Trusses- Method of joints	T1 , ch 6
18	Problems on Analysis of Trusses- Method of joints	T1 , ch 6
19	Problems on Analysis of Trusses- Method of joints	T1 , ch 6
20	Problems on Analysis of Trusses-Method of sections	T1 , ch 6
21	Problems on Analysis of Trusses-Method of sections	T1 , ch 6
22	Friction: Laws of Friction – Angle of Friction – Dry friction	T1 , ch 8
23	Problems on Dry friction	T1 , ch 8
24	Problems on Dry friction	T1 , ch 8
25	Wedge friction – problems	T1 , ch 8
26	Rolling friction – problems	T1 , ch 8
27	Belt Friction – Derivation of tension ratio of Flat Belt and V Belt- problems	T1 , ch 8
28	Problems on Belt Friction	T1 , ch 8
29	Friction in Thrust and Journal bearings - problems	T1 , ch 8
30	Friction in Thrust and Journal bearings- problems	T1 , ch 8
	Properties of Surfaces and Volumes	
31	Centre of Gravity: Centroids of lines, areas and volumes	T1 , ch 5
32	Determination of centroids by integration method-Problems	T1 , ch 5
33	Theorem of Pappus-Guldinus – problems on centroids of areas	T1 , ch 5
34	Problems on centroids of areas	T1 , ch 5
35	Problems on centroids of areas	T1 , ch 5

36	Moment of Inertia: Determination of moment of inertia of area by integration	T2, ch 4
37	Problems on Moment of Inertia by integration method	T2, ch 4
38	Problems on Moment of Inertia	T2, ch 4
39	Problems on Moment of Inertia	T2, ch 4
40	Radius of gyration – Parallel and perpendicular axis theorems	T2, ch 4
41	Polar moment of inertia – Problems	T2, ch 4
42	Problem on moment of inertia of different sections	T2, ch 4
43	Problem on moment of inertia of different sections	T2, ch 4
44	Mass moment of inertia -Problems	T2, ch 4
45	Problems on mass moment of inertia	T2, ch 4
	Dynamics of Particles	
46	Rectilinear motion – uniform velocity and uniform acceleration motion -Problems	T2, ch6
47	Curvilinear motion -rectangular components of velocity and acceleration -Problems	T2, ch6
48	Curvilinear motion -Normal and tangential components – Problems	T2, ch6
49	Curvilinear motion –radial and transverse components – Problems	T2, ch6
50	Motion of projectile –horizontal range, time of flight, maximum height, - Relative motion	T2, ch6
51	Problems on projectile motion	T2, ch6
52	Newton's II law principle - Problems	T2, ch6
53	D'Alembert's principle - Problems	T2, ch6
54	D'Alembert's principle - Problems	T2, ch6
55	Principle of work and energy (kinetic and potential energy), conservative forces –	T2, ch6
56	Problems on work energy principle	T2, ch6
57	Principle of impulse and momentum – Impulsive motion related problems	T2, ch6
58	Problems on impulse and momentum	T2, ch6
59	Impact of elastic bodies Problems on direct impact of elastic bodies	T2, ch6
60	Problems on oblique impact of elastic bodies	T2, ch6
	DYNAMICS OF RIGID BODIES	
61	Introduction to Kinematics of rigid bodies :Translation and rotation of rigid bodies-	T2, ch 7
62	Problems on Translation and rotation of rigid bodies	T2, ch 7
63	Fixed axis rotation – determination of angular velocity, displacement and acceleration.	T2, ch 7
64	Problems on fixed axis rotation	T2, ch 7
65	General plane motion – combination of translational and rotational forces	T2, ch 7
66	Problems on general plane motion	T2, ch 7
67	Problems on general plane motion	T2, ch 7
68	Relative velocity in plane motion - combination of translational and rotational forces	T2, ch 7
69	Problems on relative velocity in plane motion	T2, ch 7
70	Instantaneous center of rotation in plane motion	T2, ch 7
71	Problems on Instantaneous center of rotation	T2, ch 7
72	Principle of work and energy for a rigid body – problems	T2, ch 7
73	Problems on Principle of work and energy for a rigid body	T2, ch 7
74	Principle of impulse and momentum – problems	T2, ch 7
75	Problems on Principle of impulse and momentum	T2, ch 7

TEXTBOOKS

1. Ferdinand.P. Beer. E, Russell Johnston Jr., David Mazurek, Philip J Cornwell,"*Vector Mechanics for Engineers: Statics and Dynamics*" , McGraw - Hill,New Delhi, Tenth Edition, 2013.

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3. Rajasekaran.S, & Sankarasubramanian.G, *"Engineering Mechanics"*, VikasPublishing House Pvt Ltd, 2011.

4. Shames.I.H, and Krishna Mohana Rao.G, *"Engineering Mechanics (Statics and Dynamics)"*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education),2006.

5. Dr.Bansal.R.K, & Sanjay Bansal, *"A Text book of Engineering Mechanics"*, Lakshimi publications, Edition 7, 2011.

Section	Name	Signature
D	Mr.P.V.Jayakarthikeyan	
B	Mr.M.Sermaraj	
C	Mr.C.Subramanian	
A	Mr.R.Santhana Krishnan	
F	Mr.Vamsi Krishna Dommeti	
E	Mr.K.Ramesh	
G	Mr.Shubrajit Bhaumik	
H	Mr.Narasima rao	
I	Mr.S.Kolli Balasivarama	
J	Mr.N.Arun	
K	Mr.K.Jagadeesan	
L	Mr.G.Balasiva Krishna	

28/12/13

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