BITS – PILANI, K K BIRLA GOA CAMPUS

COURSE HANDOUT; 1ST SEMESTER 2017-18

Course Name: MECHANICS OSCILLATION & WAVES (MOW, PHY F111)

Course Number: PHY F 111

Instructor In Charge: Dr. T K Jha (B-106; VOIP: 177)

Team: Dr. G. Dar, Dr. Toby Joseph, Dr. V Sunilkumar, Dr. Ram Shanker Patel, Dr. T K Jha

Course Description: Mechanics is a mature science and is considered to be the backbone of pure & applied sciences. Starting with the evolution of the Universe to industrial growth in the present era, the physics is governed by their principles. We focus on understanding so that those underlying principles can be further applied to a variety of physical problems. The course is divided between the two paradigms i.e., Mechanics, Oscillation & Waves.

Textbook:

1) Introduction to Mechanics by Kleppner & Kolenkow.

2) Vibration & Waves by A P French

Consultancy Hours: TBA

Distribution of Lectures: MECHANICS

LECTURE NO.	TOPICS	CHAPTER/ SECTION NO	SAMPLE PROBLEMS
MODULE I: MECHANICS			
1	INTRODUCTION TO THE COURSE		
2	REVIEW: NEWTONS LAWS	CHAP 1 – 4	1.17, 1.19,1.20 2.30, 2.33
3	MOTION IN POLAR COORDINATES		4.25 - 4.30
4	ROCKET EQUATION	SECTION 3.5, 3.6	
5,6,7	ANGULAR MOMENTUM AND FIXED AXIS ROTATION	6.4 - 6.7	6.2, 6.6, 6.9, 6.14, 6.18, 6.22, 6.32, 6.37, 6.41
	MOMENT OF INERTIA TENSOR		
8,9,10	**RIGID BODY MOTION** A: Angular momentum & Torque, Example: 7.4: Rotating Skew Rod	7.1 - 7.6, Note 7.2	7.1, 7.4, 7.6, 7.11

	B: Gyroscope		
11,12,13	**NON INERTIAL SYSTEMS AND FICTITIOUS FORCES** equivalence principle, rotating systems, deflection: falling mass	8.1-8.5	8.1, 8.3, 8.4, 8.7, 8.11
14,15,16	**CENTRAL FORCE** Planetory Motion & Orbits Central force motion, Equation of ellipse, planetory motion	9.1-9.6	9.3, 9.6, 9.8
MODULE II: OSCILLATIONS & WAVES			
1,2,3	**SIMPLE HARMONIC MOTION**	CHAPTER 1-4	
	FREE, FORCES & DAMPED		
4,5	**COUPLED OSCILLATORS** What are coupled oscillators - examples; Uncoupling the equations & normal coordinates; Determine normal modes	CHAPTER 5	
6	**WAVE** 1-D Wave equation on a string Traveling wave solutions	CHAPTER 7	
7,8	Imposition of boundary conditions - stationary wave (normal mode) solutions for string tied at both ends, solutions for string forced at one end & tied at the other 2-D wave equation on a stretched elastic sheet	CHAPTER 7	
9,10,11	**Fourier analysis** Superposition of normal modes - Fourier series; Determining fourier coeffiecients of an oscillating string Superposition of waves - beats, wave pulses; Dispersion - phase & group velocity	CHAPTER 6	
12,13	BOUNDARY EFFECTS & INTERFERENCE	CHAPTER 8	

EVALUATION COMPONENTS

EXAMS	FORMAT	MARKS	WEIGHT (%)	DATE	TIME
QUIZ I	CLOSED BOOK	30	10	SEPTEMBER	30 Min
QUIZ II	CLOSED BOOK	30	10	OCTOBER	30 Min
MID-SEMESTER	OPEN BOOK	90	30	OCTOBER	90 Min
COMPREHENSIVE	OPEN BOOK	135	45	DECEMBER	180 Min
ATTENDANCE	TUTORIAL	15	5		5.5 hrs
TOTAL		**300**	**100**		

Make up Policy: Only for valid and medical reasons with proper documentation.

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(T K Jha)

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