ADAMAS UNIVERSITY

PURSUE EXCELLENCE

KOLKATA

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

B.Tech in Mechanical Engineering Programme

Course File (Theory)

Course Code & Name: MEE11002 & Engineering Mechanics

Course Coordinator: Mr. Sudip Chakraborty

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
8. **Program : B.Tech** — **T: 1**
9. **Target : 60%** — **P: 0**

C: 4

Year: I

Semester: II

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THEORY COURSE FILE CONTENTS

Check list Course Outcomes Attainment

S. No.	Contents	Available (Y/N/NA)	Date of Submission	Signature of HOD
1.	Authenticated Syllabus Copy	Y		
2.	Individual Time Table	Y		
3.	Students' Name List (Approved Copy)	Y		
4.	Course Plan, PO, PSO, COs, CO-PO Mapping, COA Plan, Session Plan and Periodic Monitoring	Y		
5.	Previous Year End Semester Question Papers	Y		
6.	Question Bank (All Units - Part A, Part B & C)	Y		
7.	Dissemination of Syllabus and Course Plan to Students	Y		
8.	Lecture Notes - Unit I, II & III	Y		
9.	**Sample Documents and Evaluation Sheet for Internal Assessment** – Tutorials / Assignments / Class Test / Open Book Test / Quiz / Project / Seminar / Role Play if any (Before Mid Term)			
10.	**Mid Term Examination** A. Question Paper / Any Other Assessment Tools Used B. Sample Answer Scripts (Best, Average, Poor) if required C. Evaluation Sheet D. Slow Learners List and Remedial Measures			
11.	Lecture Notes – Unit IV & V			
12.	**Sample Documents and Evaluation Sheet for Internal Assessment** – Tutorials / Assignments / Class Test /Open Book Test / Quiz / Project / Seminar / Role Play if any (After Mid Term)			
13.	Course End Survey (Indirect Assessment) & Consolidation			
14.	**End Term Examination** A. Question Paper & Answer Key B. Sample Answer Scripts (Best, Average, Poor) if			

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C: 4

	required C. Evaluation Sheet **D.** Slow Learners List and Remedial Measures.			
15.	Content Beyond the Syllabus (Proof)			
16.	Innovative Teaching Tools Used for TLP			
17.	Details of Visiting Faculty Session / Industry Expert / Guest Lecture / Seminar / Field Visit / Webinars / Flipped Class Room / Blended Learning / Online Resources etc.			
18.	Consolidated Mark Statement			
19.	CO Attainment (Mid Term + Internal Assessment + End Term)			
20.	Gap Analysis & Remedial Measures			
21.	CO - PO Attainment			
22.	Class Record (Faculty Logbook)			

Signature of HOD/ Dean **Signature of Faculty**

Date: **Date:**

Year: I

Semester: II

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Syllabus Copy

Course Code: MEE11002	**Course Name: Engineering Mechanics**	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	12^{th} level Physics, Mathematics				
Co-requisites					

Course Objectives:

1. To enable learners to solve force problems related to practical world.
2. To be able to determine the centroid, centre of gravity and moment of inertia.
3. To learn the effect of friction on equilibrium.
4. To learn kinematics, kinetics of particle and rigid body, related principles.
5. To introduce the concepts of Dynamic motion

Course Content

Module 1 **11 lecture hours**

Basics of Statics and Concurrent Forces

Statics of Particles: Force System: Force, classification & representation, force as a vector, composition and resolution of forces, principle of superposition and transmissibility of forces.

Statics of Rigid bodies: Equilibrium of coplanar force system, free body diagrams, determination of reactions, equilibrium of a body under three forces, Lami's theorem. Moment of a force about a point and an axis, moment of coplanar force system, Varignan's theorem.

Module 2: **18 lecture hours**

Parallel and Distributed Forces

Parallel forces in a plane, Distributed Parallel forces in a plane, couple, resolution of a force into a force and a couple, moment of a couple.

Centroid and Moment of Inertia: Determination of centre of gravity, centre of mass and centroid by direct integration and by the method of composite bodies, area moment of inertia of composite plane figures and mass moment of inertia, radius of gyration, parallel axis theorem, Pappas theorems, polar moment of inertia.

Module 3: **13 lecture hours**

Year: I

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Friction: Introduction to static and dynamic friction, laws of dry friction, cone of friction, block friction, ladder friction, wedge friction, application of friction in machines.

Module 4: 8 lecture hours

Virtual Work Virtual displacement, principle of virtual work.

Module 5: 10 lecture hours

Introduction to Dynamics Laws of motion, Projectile motion, D'Alembert's Principle, Work and energy, impulse and momentum, impact of bodies.

Text Books

1. Engineering Mechanics [Vol-I & II] by Meriam&Kraige, 5th ed. – Wiley India
2. Engineering Mechanics by S.S. Bhavikatti and K.G. Rajashekarappa – New Age International
3. Mechanics of Solids by Crandall,Dahl and Sivakumar-MC Graw Hill ,5th Edition 2015,New Delhi

Reference Books

1. Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4th ed. – PHI
2. Engineering Mechanics by Timoshenko, Young and Rao, Revised 4th ed. – TMH

Web Resources:

- **https://nptel.ac.in/courses/112/106/112106286**
- **https://nptel.ac.in/courses/112/103/112103108**

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Faculty Individual Time Table

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING MECHANICS
DEPARTMENT OF MECHANICAL ENGINEERING
Programme: B.Tech
Course Code & Course: MEE11002, Engineering Mechanics Faculty Coordinator: Mr. Sudip Chakraborty

Day & Time	09.30 - 10.30	10.30 - 11.30	11.30 - 12.30	12.30 - 1.30	01.30 - 02.30	02.30 - 03.30	03.30 - 04.30	04.30 - 05.30
Monday				LUNCH				
Tuesday								
Wednesday								
Thursday								
Friday								

Signature of HOD

Date:

Signature of Class Coordinator

Date:

Year: I

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C: 4

Students Name List

Name	Registration Number	Roll Number
Ravi lal	AU/2020/0004600	UG/02/BTBIOME/2020/002
Gaurav gain	AU/2020/0005281	UG/02/BTBIOME/2020/008
Soumyadeep Samaddar	AU/2020/0005498	UG/02/BTBIOME/2020/003
SPANDAN BHATTACHAARYA	AU/2020/0005499	UG/02/BTBIOME/2020/004
Arjya Das	AU/2020/0004536	UG/02/BTCE/2020/003
Rohit Kumar Shit	AU/2020/0004463	UG/02/BTCE/2020/002
SUNANDA JANA	AU/2020/0004275	UG/02/BTCSE/2020/002
Ritushna roy	AU/2020/0004466	UG/02/BTCSE/2020/009
Md Alnas Hossain	AU/2020/0004540	UG/02/BTCSE/2020/032
Nikhil Kumar Jha	AU/2020/0004565	UG/02/BTCSE/2020/035
RAJA BANIK	AU/2020/0004580	UG/02/BTCSE/2020/041
Arshad Raja	AU/2020/0004583	UG/02/BTCSE/2020/042
Hritik Kumar Dutta	AU/2020/0004593	UG/02/BTCSE/2020/046
SHIULI MAHATA	AU/2020/0004596	UG/02/BTCSE/2020/047
SOUGATA DUTT	AU/2020/0004472	UG/02/BTCSE/2020/012
Protyush Kr Chatterjee	AU/2020/0004479	UG/02/BTCSE/2020/018
Vivek Raj	AU/2020/0004549	UG/02/BTCSE/2020/033
Soyata Saha	AU/2020/0004562	UG/02/BTCSE/2020/034
SUPRATIM TARUN NATH	AU/2020/0004276	UG/02/BTCSE/2020/003
Atanu Pramanick	AU/2020/0004529	UG/02/BTCSE/2020/027
Ayan Kumar Das	AU/2020/0004530	UG/02/BTCSE/2020/028

Year: I

Semester: II

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SURAJ MAJUMDER	AU/2020/0004462	UG/02/BTCSE/2020/007
Prima Giri	AU/2020/0004468	UG/02/BTCSE/2020/011
ABHIPSIT BHATTACHARJEE	AU/2020/0004451	UG/02/BTCSE/2020/004
Arkadeep Chatterjee	AU/2020/0004464	UG/02/BTCSE/2020/008
Indranil Das	AU/2020/0004494	UG/02/BTCSE/2020/022
ANIRBAN ROY	AU/2020/0005542	UG/02/BTCSE/2020/052
nandini roy	AU/2020/0004569	UG/02/BTCSE/2020/036
ALOK DUTTA	AU/2020/0004250	UG/02/BTCSE/2020/001
SOUMYADWIP MAITY	AU/2020/0004557	UG/02/BTCSEAIML/2020/006
Rohit kumar Roy	AU/2020/0004563	UG/02/BTCSEAIML/2020/009
Md Sohail Irfan	AU/2020/0004578	UG/02/BTCSEAIML/2020/013
SUBARNA BHOWMIK	AU/2020/0004572	UG/02/BTCSEAIML/2020/011
Chandrachur Majhi	AU/2020/0004588	UG/02/BTCSEAIML/2020/015
Sabyasachi Paul	AU/2020/0004587	UG/02/BTCSECSF/2020/006
Arya Paul	AU/2020/0004465	UG/02/BTECE/2020/001
Utsab Bose	AU/2020/0004486	UG/02/BTECE/2020/002
ROHIT RAJ HALDER	AU/2020/0004566	UG/02/BTECE/2020/004
Arka Jyoti Das	AU/2020/0004560	UG/02/BTEE/2020/002
Saptarshi Bhattacharjee	AU/2020/0004481	UG/02/BTEE/2020/001
Suman Hait	AU/2020/0004471	UG/02/BTME/2020/001
Koushik Ghosh	AU/2020/0004484	UG/02/BTME/2020/002
Reetam Mondal	AU/2020/0004555	UG/02/BTME/2020/005
Rakesh Kumar Mozumder	AU/2020/0004495	UG/02/BTME/2020/004

Year: I

Semester: II

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Signature of HOD/Dean **Signature of Class Coordinator**

Date: **Date:**

COURSE PLAN

Target	60% (marks)
Level-1	50% (population)
Level-2	60% (population)
Level-3	70% (population)

1. Method of Evaluation

UG
Internal Assessment (30%) (Quizzes/Tests, Assignments & Seminars etc.)
Mid Semester Examination (20%)
End Semester Examination (50%)

2. Passing Criteria

Scale	UG
Out of 10 Point Scale	CGPA – "5.00" Min. Individual Course Grade – "C" Passing Minimum – 35

3. Pedagogy

- Direct Instruction
- Kinesthetic Learning
- Flipped Classroom
- Differentiated Instruction
- Expeditionary Learning
- Inquiry Based Learning
- Game Based Learning
- Personalized Learning

4. Topics introduced for the first time in the program through this course

Year: I

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- (New Topics Related to this Course – Syllabus Revision if any/Content Beyond Syllabus)

5. **References:**

Text Books	Web Resources	Journals	Reference Books
3	2		2

Signature of HOD/Dean **Signature of Faculty**

Date: **Date:**

Year: I

Semester: II

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C: 4

GUIDELINES TO STUDY THE SUBJECT

Instructions to Students:

1. Go through the 'Syllabus' in the LMS in order to find out the Reading List.
2. Get your schedule and try to pace your studies as close to the timeline as possible.
3. Get your on-line lecture notes (Content, videos) at Lecture Notes section. These are our lecture notes. Make sure you use them during this course.
4. check your LMS regularly
5. go through study material
6. check mails and announcements on blackboard
7. keep updated with the posts, assignments and examinations which shall be conducted on the blackboard
8. Be regular, so that you do not suffer in any way
9. C**ell Phones and other Electronic Communication Devices:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.
10. **E-Mail and online learning tool:** Each student in the class should have an e-mail id and a pass word to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.
11. **Attendance:** Students are required to have minimum attendance of 75% in each subject. Students with less than said percentage shall NOT be allowed to appear in the end semester examination.

This much should be enough to get you organized and on your way to having a great semester! If you need us for anything, send your feedback through e-mail sudip.chakraborty@adamasuniversity.ac.in Please use an appropriate subject line to indicate your message details.

There will no doubt be many more activities in the coming weeks. So, to keep up to date with all the latest developments, please keep visiting this website regularly.

Year: I

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RELATED OUTCOMES

1. **The expected outcomes of the Program are:**

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Year: I

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2. The expected outcomes of the Specific Program are: (up to 3)

PSO1	Plan the manufacturing of given mechanical components and systems using engineering analysis & design tools, process planning and modern manufacturing methods
PSO2	Understand the dynamics of machine components and design components including power transmission, pressure vessels, IC engine components
PSO3	Determine the performance of thermal and fluid systems including IC engines, refrigeration and air-conditioning, and power generating systems

3. **The expected outcomes of the Course are: (minimum 4 and maximum 6)**

CO1	On completion of this course, the students will be able to Apply conditions of equilibrium of bodies subjected to forces
CO2	Determine the centroid, centre of gravity and moment of inertia of various one dimensional and two-dimensional objects
CO3	Analyse motion under the effect of dynamic friction
CO4	Apply the concept of virtual work for bodies in equilibrium
CO5	Apply the D'Alembert's Principle for reducing the problem of kinetics to equivalent statics problem.

4. Co-Relationship Matrix

Indicate the relationships by 1- Slight (Low) 2- Moderate (Medium) 3-Substantial (High)

Program Outcomes / Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	03	03	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	03	03	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	03	03	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	03	03	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	03	03	-	-	-	-	-	-	-	-	-	-	-	1	-
Average	**03**	**03**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0.2**	**-**

Year: I

Semester: II

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5. **Course Outcomes Assessment Plan (COA):**

Course Outcomes	Internal Assessment* (30 Marks)		Mid Term Exam (20 Marks)	End Term Exam (50 Marks)	Total (100 Marks)
	Before Mid Term	After Mid Term			
CO1	6	NA	10	4	20
CO2	6	NA	10	4	20
CO3	NA	8	NA	12	20
CO4	NA	7	NA	13	20
CO5	NA	3	NA	17	20
Total	12	18	20	50	100

* Internal Assessment – Tools Used: Tutorial, Assignment, Seminar, Class Test etc.

Year: I

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OVERVIEW OF COURSE PLAN OF COURSE COVERAGE

Course Activities:

S. No.	Description	Planned			Actual			Remarks
		From	To	No. of Session	From	TO	No. of Session	
1.	Basics of Statics and Concurrent Forces	05/04/2021	26/04/2021	11				
2.	Parallel and Distributed Forces	28/04/2021	02/06/2021	18				
3.	Friction	03/06/2021	24/06/2021	13				
4.	Virtual Work	25/06/2021	08/07/2021	8				
5.	Introduction to Dynamics	09/07/2021	28/07/2021	10				

Total No. of Instructional periods available for the course: 60 Sessions

Signature of HOD/Dean — **Signature of Faculty**

Date: — **Date:**

Year: I

Semester: II

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C: 4

SESSION PLAN
UNIT-I

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	05/04/2021	Introduction to the course & Prerequisite knowledge	CO1				
2	07/04/2021	Introduction, Force & Two-Dimensional Force system	CO1				
3	08/04/2021	Resolution of Force & their Application	CO1				
4	09/04/2021	Composition of Force & their Application	CO1				
5	12/04/2021	Concept of particle and Rigid body, Vector	CO1				
6	15/04/2021	Concept of particle and Rigid body, Vector	CO1				
7	16/04/2021	Introduction to equilibrium and concept of Lami's Theorem	CO1				
8	19/04/2021	Concept of Free body Diagram	CO1				
9	22/04/2021	Equation of Equilibrium.	CO1				
10	23/04/2021	Numerical Problem related to Free body diagram	CO1				
11	26/04/2021	Numerical Problem related to Free body diagram of circular body	CO1				

Remarks:

Signature of Faculty

Year: I

Semester: II

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SESSION PLAN
UNIT-II

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	28/04/2021	Moment of a force about a point and an axis	CO2				
2	29/04/2021	Moment of forces and their numerical problems	CO2				
3	30/04/2021	Distributed Parallel forces in a plane & Concept of Varignan's theorem.	CO2				
4	03/05/2021	Couple and their numerical problems	CO2				
5	05/05/2021	Introduction to Center of Mass and Centroid	CO2				
6	06/05/2021	Centroid of Mass	CO2				
7	10/05/2021	Centroid of Line and Area (Triangle, Circular section, Quadrilateral, Composite Area etc.).	CO2				
8	12/05/2021	Numerical problem related to CG	CO2				
9	14/05/2021	Numerical problem related to CG of 2-Dimensional body	CO2				
10	17/05/2021	Numerical problem related to CG of 3-Dimensional body	CO2				
11	19/05/2021	Mass Moment of Inertia of Symmetrical bodies	CO2				

Year: I

Semester: II

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C: 4

12	20/05/2021	Area Moment of Inertia	CO2				
13	21/05/2021	Introduction, M.I of Plane figures w.r.t an axis on its plane	CO2				
14	24/05/2021	M.I of plane figures w.r.t an axis perpendicular to its plane	CO2				
15	27/05/2021	Parallel axis theorem.	CO2				
16	28/05/2021	Numerical problem related to MI	CO2				
17	31/05/2021	Numerical problem related to MI of geometrical 2-Dimentional body	CO2				
18	02/06/2021	Numerical problem related to MI of Unsymmetrical body	CO2				

Remarks:

Signature of Faculty

Date:

Year: I

Semester: II

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8. Program : B.Tech **T: 1**

9. Target : 60% **P: 0**

C: 4

SESSION PLAN

UNIT-III

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	03/06/2021	Introduction to Friction	CO3				
2	04/06/2021	Concept of Friction-Angle of friction and angle of repose	CO3				
3	07/06/2021	Law of Coulomb Friction	CO3				
4	09/06/2021	Static & Dynamic Friction	CO3				
5	10/06/2021	Limiting Friction, Coefficient of Friction	CO3				
6	11/06/2021	Application of Friction in Machines	CO3				
7	14/06/2021	Numerical problem related to friction when the body rest on horizontal plane	CO3				
8	16/06/2021	Numerical problem related to friction when the body is in inclined plane	CO3				
9	17/06/2021	Numerical problem related to friction when the body is under maximum and minimum force.	CO3				
10	18/06/2021	Concept of ladder friction	CO3				

Year: I

Semester: II

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C: 4

11	21/06/2021	Numerical Problem related to Ladder Friction	CO3				
12	23/06/2021	Concept of Wedge friction	CO3				
13	24/06/2021	Numerical Problem related to wedge friction	CO3				

Remarks:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
8. **Program : B.Tech** — **T: 1**
9. **Target : 60%** — **P: 0**, **C: 4**

SESSION PLAN
UNIT-IV

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	25/06/2021	Concept of Virtual Work & Principle of Virtual Work	CO4				
2	28/06/2021	Application of Principle of Virtual Work on Beams Carrying Point Load	CO4				
3	30/06/2021	Numerical Problem related to virtual work on Beams carrying Point Load	CO4				
4	01/07/2021	Application of Principle of Virtual Work on Beams Carrying Uniformly Distributed Load.	CO4				
5	02/07/2021	Numerical Problem related to virtual work on Beams carrying Uniformly Distributed Load.	CO4				
6	05/07/2021	Application of Principle of Virtual Work on Ladders	CO4				
7	07/07/2021	Numerical Problem related to virtual work on Ladder	CO4				
8	08/07/2021	Application of Principle of Virtual	CO4				

Year: I

Semester: II

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8. **Program : B.Tech** **T: 1**
9. **Target : 60%** **P: 0**

C: 4

		Work on Lifting Machines					

Remarks:

Signature of Faculty

Date:

SESSION PLAN

UNIT-V

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	09/07/2021	Newton's Laws of Motion	CO5				
2	14/07/2021	Concept of Motion of a Lift.	CO5				
3	15/07/2021	D'Alembert's Principle & related to few numerical problems.	CO5				
4	16/07/2021	Indicated Power, Brake Power, Efficiency of an Engine	CO5				
5	19/07/2021	Concept of Projectile motion & important terms related to projectile motion.	CO5				
6	21/07/2021	Derive the Equation of the Path of a Projectile	CO5				

Year: I

Semester: II

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7. Course : Engineering Mechanics **L: 3**

8. Program : B.Tech **T: 1**

9. Target : 60% **P: 0**

C: 4

7	22/07/2021	Time of Flight of a Projectile on a Horizontal Plane	CO5				
8	23/07/2021	Horizontal Range of a Projectile	CO5				
9	26/07/2021	Maximum Height of a Projectile on a Horizontal Plane	CO5				
10	28/07/2021	Numerical Problem related to projectile motion.	CO5				

Remarks:

Signature of Faculty

Date:

Year: I

Semester: II

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9. Target : 60% — P: 0
C: 4

PERIODIC MONITORING

Actual date of completion and remarks, if any

Components		From	To	From	To
Duration (Mention from and to Dates)		05/04/2021	16/06/2021	17/06/2021	02/08/2021
Percentage of Syllabus covered		50%		50%	
Lectures	Planned	1	23	24	45
	Taken				
Tutorials	Planned	1	8	9	15
	Taken				
Test/Quizzes/ Mid Semester/ End Semester	Planned	1	1(MID)	1	1(END)
	Taken				
	CO's Addressed	CO1 & CO2	CO1 & CO2	CO3, CO4, CO5	CO1, CO2, CO3, CO4, CO5
	CO's Achieved	CO1 & CO2	CO1 & CO2	CO3, CO4, CO5	CO1, CO2, CO3, CO4, CO5
Assignments	Planned	1	1		1
	Taken				
	CO's Addressed	CO1	CO2	CO3	CO4, CO5
	CO's Achieved	CO1	CO2	CO3	CO4, CO5
Signature of Faculty					
Head of the Department					
OBE Coordinator					

Signature of HOD/ Dean

Date

Signature of Faculty

Dat

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

PERIODIC MONITORING

Attainment of the Course (Learning) Outcomes:

Components	Attainment level	Action Plan	Remarks
Assignment	CO1:	Submission Target 28/04/2021	Assignment Questions Covered the Basics of Statics and Concurrent Forces
	CO2:	Submission Target 03/06/2021	Covered Parallel and Distributed Forces
	CO3:	Submission Target 25/06/2021	Covered Friction
	CO4:	Submission Target 29/07/2021	Assignment Questions Covered the virtual Work & Introduction to Dynamics
	CO5:		
Quiz/Test etc.	CO1:	Conducted on 17/05/2021	Basics of Statics and Concurrent Forces & Basics of Statics and Concurrent Forces
	CO2:		
	CO3:	Conducted on 30/07/2021	Friction, virtual Work & Introduction to Dynamics
	CO4:		
	CO5:		
Mid Semester	CO1:		Question Bank Given for CO1 & CO2 to understand the Pattern of Exam
	CO2:		
	CO3:		
	CO4:		
	CO5:		
End Semester	CO1:		Question Bank Given for al COs to understand the Pattern of Exam
	CO2:		
	CO3:		
	CO4:		
	CO5:		
Any Other	CO1:		
	CO2:		
	CO3:		
	CO4:		
	CO5:		

Signature of HOD/ Dean — Signature of Faculty

Date — Date

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty **Course Code: MEE11002**

7. Course : Engineering Mechanics **L: 3**

8. Program : B.Tech **T: 1**

9. Target : 60% **P: 0**

C: 4

Sample Question Paper- Set 1

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

END -SEMESTER EXAMINATIONS (JUNE 2019)

NAME OF THE PROGRAM: B. Tech

DEPARTMENT: ME/CSE/ECE/EE/CE/BIOTECH **SEMESTER: II**

SUBJECT NAME: Engineering Mechanics **Total No of Pages: 2**

SUBJECT CODE: EME41104

Time: 3 Hrs.

Maximum Marks: 40

Group– A (Question no. 1 is compulsory.)

1. Answer all the Five Questions $(5 \times 1\,Marks = 5\,Marks)$

(i) The Lami's Theorem is applicable only for
(A) Coplaner forces (B) Concurrent forces (C) Coplaner & concurrent forces
(D) All of these

(ii) The moment of inertia of rectangular section 3 cm wide and 4 cm deep about X-X axis is:
(A) 16 cm4 (B)18 cm4 (C)20 cm4 (D)14 cm4

(iii) If the resultant of two equal forces has the same magnitude as either of the forces, then the angle between the two forces is
(A) 30° (B) 60° (C) 90° (D) 120°

(iv) The maximum frictional force, which comes into play, when a body just begins to slide over the surface of the other body, is known as
(A) Limiting friction (B) static friction (C) Dynamic friction (D) None of these

(v) The moment of inertia of a triangular section of base (b) and height (h) about an axis through its c. g and parallel to the base is given by the relation.
(A) bh3/36 (B) bh3/12 (C) bh3/24 (D) bh3/48

Group– B

Answer any three questions $(3 \times 5\,Marks = 15\,Marks)$

2. Explain:
(a) Varignon's principle of moments

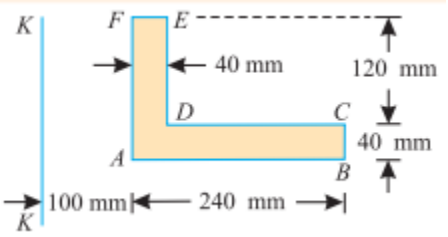
(b) Polygon law of forces

Year: I

Semester: II

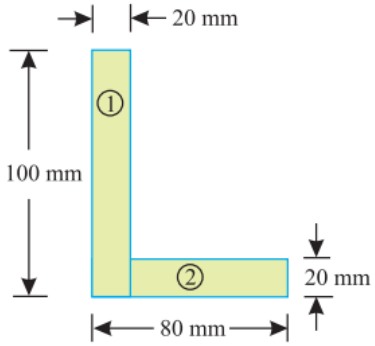
6. Name of the Faculty: Mr. Sudip Chakraborty		**Course Code: MEE11002**
7. Course	**: Engineering Mechanics**	**L: 3**
8. Program	**: B.Tech**	**T: 1**
9. Target	**: 60%**	**P: 0**
		C: 4

3. Figure 7.12 shows an area ABCDEF.

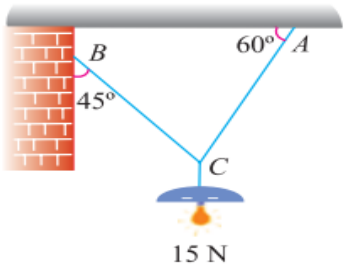


Compute the moment of inertia of the above area about axis K-K.

4. Find the centroid of an unequal angle section 100 mm × 80 mm × 20 mm. (5)



5. An electric light fixture weighting 15 N hangs from a point C, by two strings AC and BC. The string AC is inclined at 60° to the horizontal and BC at 45° to the horizontal as shown in Figure 1. Using Lami's theorem, determine the forces in the string's AC and BC. (5)



6. A horizontal line PQRS is 12 m long, where PQ = QR = RS = 4 m. Forces of 1000 N, 1500 N, 1000 N and 500 N act at P, Q, R and S respectively with downward direction. The lines of action of these forces make angles of 90°, 60°, 45° and 30° respectively with PS. Find the magnitude, direction and position of the resultant force.

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** **Course Code: MEE11002**
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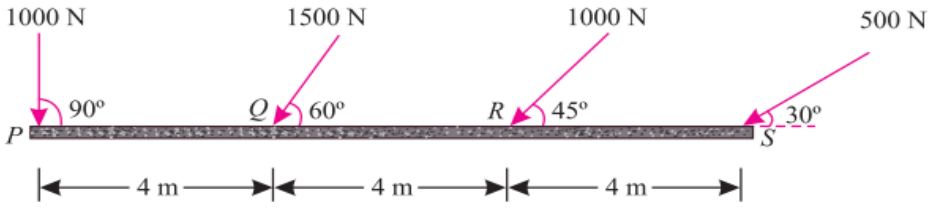
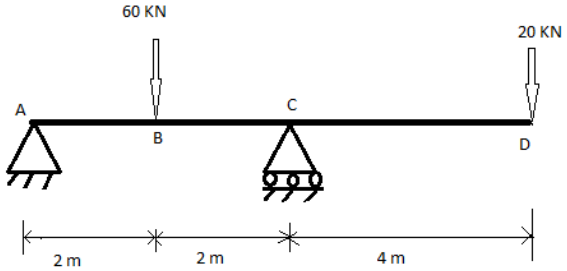
9. **Target : 60%** **P: 0**
C: 4



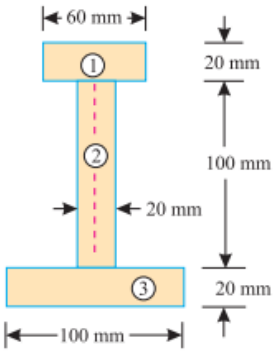
Group– C

Answer any two questions $(2 \times 10\ Marks\ =\ 20\ Marks)$

7. (a) Explain principle of transmissibility?
(b)Find out the reaction forces at support as shown in figure below using principle of virtual work.



8. (a) Derive perpendicular axis theorem of moment of inertia.
(3)
(b) An I-section is made up of three rectangles as shown in Figure below. Find the moment of inertia of the section about the horizontal axis.
(7)



9. (a) Explain Laws of friction?
(b) An effort of 200 N is required just to move a certain body up an inclined plane of angle 15° the force acting parallel to the plane. If the angle of inclination of the plane is made 20° the effort required, again applied parallel to the plane, is found to be 230 N. Find the weight of the body and the coefficient of friction.

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
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9. Target : 60% — P: 0
C: 4

Question Bank Sample

School: School Of Engineering & Technology — **Department: ME/EE/CSE/CE/ECE/Bio-Tech**
Course Code: EME41102 — **Course Name: Engineering Mechanics**
Program: B.Tech — **Semester: 2nd**

Sl. No.	Question	Level of Difficulty (Easy/ Medium/ Difficult)	Knowledge Level (Bloom's Taxonomy)	Course Outcome (CO)
	Part A (Multiple Choice Questions) (1 mark each)			
1.	The Forces, which meet at one point, but their lines do not lie in a plane, are called, a) Coplanar non-concurrent forces b) Non-coplanar concurrent forces c) Non-coplanar non-concurrent forces d) Intersecting forces	**Easy**	**U**	**1**
2.	A single force and a couple acting in the same plane upon a rigid body, a) Balance each other b) Cannot balance each other c) Produce moment of a couple d) Are equivalent	**Medium**	**R**	**1**
3.	If a rigid body is in equilibrium under the action of three forces, then a) These forces are equal b) The lines of action of these forces meet in a point c) The lines of action of these forces are parallel d) (b) and (c) above **e)** None of the above.	**Difficult**	**Ap**	**1**
	Part B (Definition/Naming Questions) (2 marks each)			

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
8. **Program : B.Tech** — **T: 1**
9. **Target : 60%** — **P: 0**, **C: 4**

1.	State Varigon's Theorem?	**Easy**	**U**	**1**
2.	What is the different between a resultant force and equilibrant force?	**Medium**	**Ap**	**1**
3.	Explain the concept of Free body diagram with example. Also write down necessary and sufficient conditions of equilibrium for coplanar and nonconcurrent system.	**Difficult**	**R**	**1**
Part C (Short Questions) (3-4 marks each)				
1.	Explain the concept of Free body diagram with example. Also write down necessary and sufficient conditions of equilibrium for coplanar and nonconcurrent system.	**Easy**	**U**	**1**
2.	For what condition the moment of a force will be Zero? Explain	**Medium**	**Ap**	**1**
3.	A force of magnitude 500N is passing through the origin and a point A (0.2,1,0)m. Write the couple form of the force	**Difficult**	**R**	**1**
Part D (Explanation Based Questions) (5 marks each)				
1.	Show that the algebraic sum of the resolved part of a number of forces in a given direction, is equal to the resolved part of their resultant in the same direction.	**Easy**	**U**	**1**
2.	Show that if three coplanar forces, acting at a point be in equilibrium, then each force is proportional to the sine of the angle between the other two.	**Medium**	**Ap**	**1**
3.	ABCD is a square, each side being 20cm and E is a middle point AB. Forces of 7, 8, 12, 5, 9 and 6 KN act on the lines of directions AB, EC, BC, BD, CA and DE respectively. Find the magnitude, direction and position of the resultant force.	**Difficult**	**U**	**1**
Part E (Questions Based on Reasoning) (5 marks each)				
1.	The resultant of two forces P and Q is R. If the Q is doubled, the new resultant is perpendicular to P. Prove that Q=R	**Easy**	**Ap**	**1**

Year: I

Semester: II

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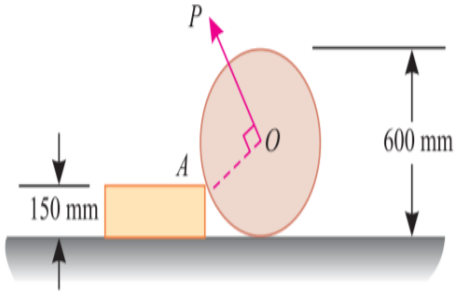
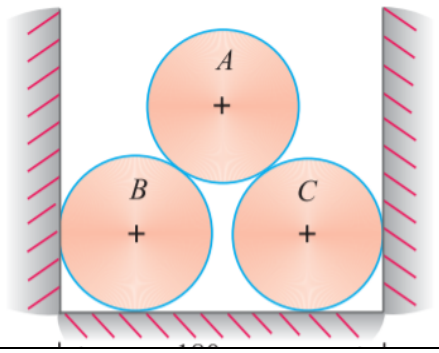
9. **Target : 60%** — **P: 0**, **C: 4**

2.	A uniform wheel of 600 mm diameter, weighing 5 kN rests against a rigid rectangular block of 150 mm height as shown in Fig. Find the least pull, through the centre of the wheel, required just to turn the wheel over the corner A of the block. Also find the reaction on the block. Take all the surfaces to be smooth. 	**Medium**	**Ap**	**1**
3.	A machine component of length 2.5 metres and height 1 metre is carried upstairs by two men, who hold it by the front and back edges of its lower face. If the machine component is inclined at 30° to the horizontal and weighs 100 N, find how much of the weight each man supports?	**Difficult**	**Ap**	**1**
Part F (Application Based Questions) (5-10 marks each)				
1.	Two equal heavy spheres of 50 mm radius are in equilibrium within a smooth cup of 150 mm radius. Show that the reaction between the cup of one sphere is double than that between the two spheres.	**Easy**	**Ap**	**1**
2.	Three cylinders weighting 100 N each and of 80 mm diameter are placed in a channel of 	**Medium**	**Ap**	**1**

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
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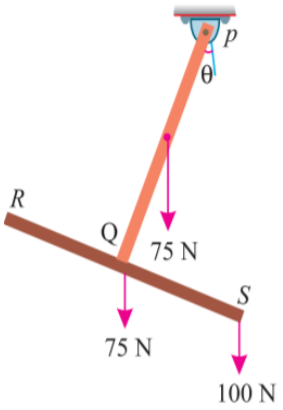
9. **Target : 60%** — **P: 0**, **C: 4**

	180 mm width as shown in Fig.. Determine the pressure exerted by (i) the cylinder A on B at the point of contact, (ii) the cylinder B on the base.			
3.	Two identical prismatic bars PQ and RS each weighing 75 N are welded together to form a Tee and are suspended in a vertical plane as shown in Fig. Calculate the value of θ, that the bar PQ will make with vertical when a load of 100 N is applied at S. 	**Difficult**	**Ap**	**1**
Part G (Short Notes) (5 marks each)				
1.	Rigid Body	**Easy**	**U**	**1**
2.	Static and Dynamics of rigid body	**Medium**	**R**	**1**
3.	Stable, Unstable and Natural Equilibrium	**Difficult**	**U**	**1**

Part A (Multiple Choice Questions) (1 mark each)				
1.	The moment of inertia of a solid sphere of mass '*m*' and radius '*r*' is, a) $2mr^2/3$ b) $2mr^2/5$ c) mr^2 d) $mr^2/2$	**Easy**	**U**	**2**
2.	The moment of inertia of a square of side *a* about its diagonal is, a) $a^4/8$ b) $a^4/12$	**Medium**	**R**	**2**

Year: I

Semester: II

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	c) $a^4/36$ d) $a^4/16$			
3.	The centre of gravity a *T*-section 100 mm × 150 mm × 50 mm from its bottom is, a) 50mm b) 75mm c) 87.5mm d) 125mm	**Difficult**	**U**	**2**
	Part B (Definition/Naming Questions) (2 marks each)			
1.	Distinguish between centre of gravity and centroid.	**Easy**	**U**	**2**
2.	What is Routh's rule for finding out the moment of inertia of an area?	**Medium**	**R**	**2**
3.	Distinguish between area and mass moment of inertia of a body.	**Difficult**	**R**	**2**
	Part C (Short Questions) (3-4 marks each)			
1.	Describe the various methods of finding out the centre of gravity of a body.	**Easy**	**U**	**2**
2.	State the parallel and perpendicular axis theorem applied to moment of Inertia.	**Medium**	**R**	**2**
3.	Distinguish between Axis of Symmetry and Axis of revolution.	**Difficult**	**R**	**2**
	Part D (Explanation Based Questions) (5 marks each)			
1.	State and prove the theorem of perpendicular axis applied to moment of inertia.	**Easy**	**U**	**2**
2.	Prove the parallel axis theorem in the determination of moment of inertia of areas with the help of a neat sketch.	**Medium**	**R**	**2**
3.	Derive an equation for moment of inertia of the hollow circular sections about centroidal axis:	**Difficult**	**R**	**2**
	Part E (Questions Based on Reasoning) (5 marks each)			
1.	A body consisting of a cone and hemisphere of radius r fixed on the same base rests on a table, the hemisphere being in contact with the table. Find	**Easy**	**Ap**	**2**

Year: I

Semester: II

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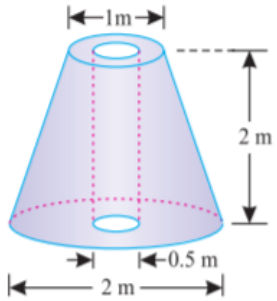
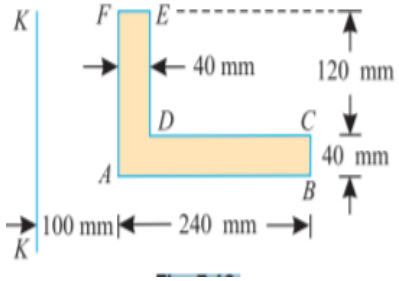
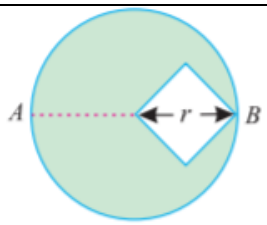
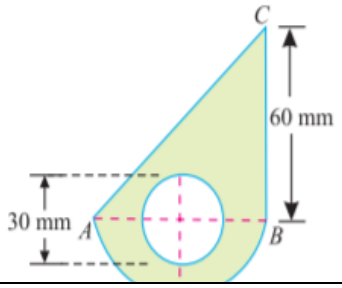
	the greatest height of the cone, so that the combined body may stand upright			
2.	A frustum of a solid right circular cone has an axial hole of 50 cm diameter as shown in Fig. Determine the centre of gravity of the body 	**Medium**	**Ap**	**2**
3.	Figure shows an area ABCDEF. Compute the moment of inertia of the above area about axis K-K. 	**Difficult**	**Ap**	2
Part F (Application Based Questions) (5-10 marks each)				
1.	When will the product of inertia of an area become Zero?	**Easy**	**Ap**	**2**
2.	A square hole is punched out of circular lamina, the diagonal of the square being the radius of the circle as shown in Fig. Find the centre of gravity of the remainder, if r is the radius of the circle 	**Medium**	**Ap**	**2**
3.	Find the moment of inertia of the lamina with a circular hole of 30 mm diameter about the axis AB as shown in Fig. 	**Difficult**	**Ap**	2

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** **Course Code: MEE11002**
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C: 4

	Part G (Short Notes) (5 marks each)			
1.	Centroid	**Easy**	**U**	**2**
2.	Parallel and perpendicular axis theorem	**Medium**	**U**	**2**
3.	Radius of Gyration	**Difficult**	**U**	**2**

	Part A (Multiple Choice Questions) (1 mark each)			
1.	The force of friction between two bodies in contact, (a) Depends upon the area of their contact (b) Depends upon the relative velocity between them (c) Is always normal to the surface of their contact (d) All of the above	**Easy**	**U**	**3**
2.	The magnitude of the force of friction between two bodies, one lying above the other, depends upon the roughness of the, (a) Upper body (b) Lower body (c) Both the bodies (d) The body having more roughness	**Medium**	**U**	3
3.	The force of friction always acts in a direction opposite to that (a) In which the body tends to move (b) In which the body is moving (c) Both (a) and (b) (d) None of the two	**Difficult**	**U**	**3**
	Part B (Definition/Naming Questions) (2 marks each)			
1.	Define coefficient of friction and limiting friction.	**Easy**	**R**	**3**
2.	State the laws of friction.	**Medium**	**R**	**3**
3.	What is angle of friction and angle of repose	**Difficult**	**R**	**3**

Year: I

Semester: II

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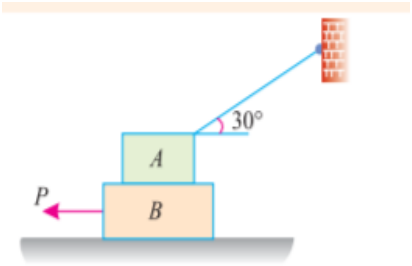
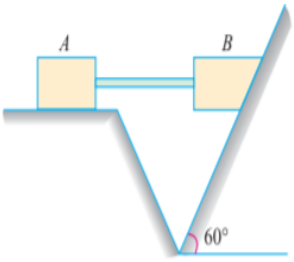
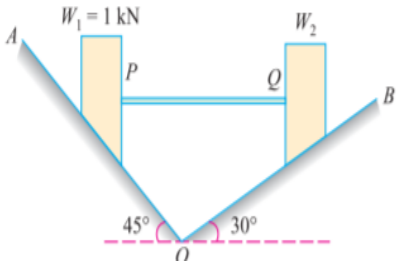
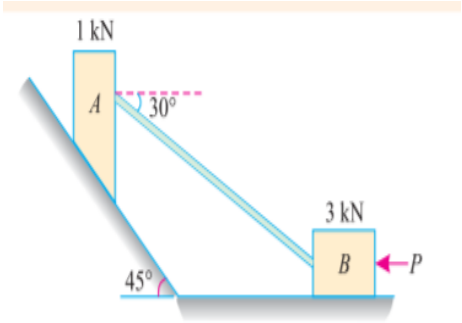
9. **Target : 60%** — **P: 0**, **C: 4**

Part C (Short Questions) (3-4 marks each)				
1.	Prove that the angle of repose and angle of friction are equal for freely falling down of a body in any inclined plane.	**Easy**	U	**3**
2.	Write down the application of friction.	**Medium**	**U**	**3**
3.	Find the horizontal force required to drag a body of weight 100 N along a horizontal plane. If the plane, when gradually raised up to 15°, the body will begin to slide.	**Difficult**	**Ap**	**3**
Part D (Explanation Based Questions) (5 marks each)				
1.	A body of weight 300 N is lying on a rough horizontal plane having a coefficient of friction as 0.3. Find the magnitude of the force, which can move the body, while acting at an angle of 25° with the horizontal.	**Easy**	**Ap**	**3**
2.	Two blocks A and B of weights 1 kN and 2 kN respectively are in equilibrium position as shown in Fig. If the coefficient of friction between the two blocks as well as the block B and the floor is 0.3, find the force (P) required to move the block B. 	**Medium**	**Ap**	**3**
3.	Two blocks A and B, connected by a horizontal rod and frictionless hinges are supported on two rough planes as shown in Fig. 	**Difficult**	**Ap**	

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
8. **Program : B.Tech** — **T: 1**
9. **Target : 60%** — **P: 0**, **C: 4**

	The coefficients of friction are 0.3 between block A and the horizontal surface, and 0.4 between block B and the inclined surface. If the block B weighs 100 N, what is the smallest weight of block A, that will hold the system in equilibrium?			**3**
Part E (Questions Based on Reasoning) (5 marks each)				
1.	A load of 1.5 kN, resting on an inclined rough plane, can be moved up the plane by a force of 2 kN applied horizontally or by a force 1.25 kN applied parallel to the plane. Find the inclination of the plane and the coefficient of friction	**Easy**	**Ap**	3
2.	Two loads, W1 (equal to 1 kN) and W2 resting on two inclined rough planes OA and OB are connected by a horizontal link PQ as shown in Fig. Find the maximum and minimum values of W2 for which the equilibrium can exist. Take angle of friction for both the planes as 20^0 	**Medium**	**Ap**	**3**
3.	A block (A) weighing 1 kN rests on a rough inclined plane whose inclination to the horizontal is 45°. This block is connected to another block (B) weighing 3 kN rests on a rough horizontal plane by a weightless rigid bar 	**Difficult**	**Ap**	**3**

Year: I
Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
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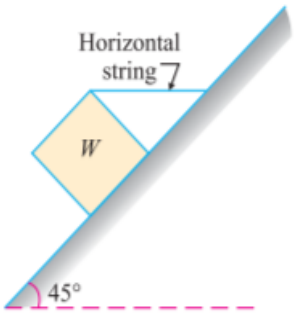
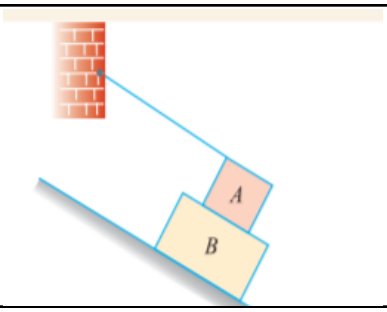
9. **Target : 60%** — **P: 0**, **C: 4**

	inclined at an angle of 30° to the horizontal as shown in Fig. Find horizontal force (P) required to be applied to the block (B) just to move the block (A) in upward direction. Assume angle of limiting friction as 15° at all surface where there is sliding			
Part F (Application Based Questions) (5-10 marks each)				
1.	A load of 500 N is lying on an inclined plane, whose inclination with the horizontal is 30°. If the coefficient of friction between the load and the plane is 0.4, find the minimum and maximum horizontal force, which will keep the load in equilibrium.	**Easy**	**Ap**	3
2.	A rectangular prism (W) weighing 150 N, is lying on an inclined plane whose inclination with the horizontal is shown in Fig. The block is tied up by a horizontal string, which has a tension of 50 N. From fundamentals find (i) the frictional force on the block (ii) the normal reaction of the inclined plane, (iii) the coefficient of friction between the surface of contact. 	**Medium**	**Ap**	**3**
3.	Two blocks A and B of weight 100 N and 300 N respectively are resting on a rough inclined plane as shown in Fig. Find 	**Difficult**	**Ap**	

Year: I
Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
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9. **Target : 60%** — **P: 0**
C: 4

	the value of the angle (θ) when the block B is about to slide. Take coefficient of friction between the two blocks as well as block B and the inclined plane as 0.25.			**3**
Part G (Short Notes) (5 marks each)				
1.	Limiting Friction	**Easy**	**R**	**3**
2.	Coefficient of Friction	**Medium**	**R**	**3**
3.	Angle of Friction	**Difficult**	**R**	**3**

Part A (Multiple Choice Questions) (1 mark each)				
1.	The term 'virtual work' refers to (a) actual work done by virtual forces (b) virtual work done by actual forces (c) virtual work done by virtual forces	**Easy**	**U**	**4**
2.	The principle of virtual work is applicable for the bodies in equilibrium (a) Agree (b) Disagree	**Medium**	**U**	**4**
3.	The principle of virtual work can be applied for all types of (a) possible displacements (b) impossible displacement (c) none of the two	**Difficult**	**U**	**4**
	Part B (Definition/Naming Questions) (2 marks each)			
1.	What is the concept of virtual work?	**Easy**	**R**	**4**
2.	What is beam? Write down the name of different types of beam.	**Medium**	**R**	**4**
3.	Explain the concept of zero, negative and positive work done.	**Difficult**	**R**	**4**
Part C (Short Questions) (3-4 marks each)				

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
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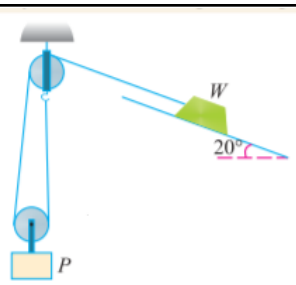
9. **Target : 60%** — **P: 0**, **C: 4**

1.	State the principle of virtual work	**Easy**	**U**	**4**
2.	Explain the principle of virtual work applied in lifting machine	**Medium**	**R**	**4**
3.	Explain the principle of virtual work on beams carrying point load	**Difficult**	**Ap**	**4**
Part D (Explanation Based Questions) (5 marks each)				
1.	State the principle of virtual work, and explain how it can be used for solving problems in statics.	**Easy**	**U**	**4**
2.	How will apply the principle of virtual work in finding out the forces in a framed structure.	**Medium**	**R**	**4**
3.	State the principle of virtual work	**Difficult**	**R**	**4**
Part E (Questions Based on Reasoning) (5 marks each)				
1.	A block of weight (W) rests on the smooth surface inclined at 20° with the horizontal. The block is supported by an effort (P) hung from a pulley as shown in Fig. Using the principle of virtual work, obtain expression for (P) in terms of (W), when the system is at rest. 	**Easy**	**Ap**	**4**
2.	The diameter of the pulleys in a differential pulley block are 300 mm and 250 mm respectively. Using the principle of virtual work and neglecting friction, find the value of the effort required to lift a load of 3 kN.	**Medium**	**Ap**	**4**
3.	Five rods AB, BC, CD, DA and DB each of equal length and cross-section are pin-jointed together, so as to form a plane frame ABCD. The frame is suspended from the top most joint A. A weight (W) is attached at the lower most joint C. Neglecting	**Difficult**	**Ap**	**4**

Year: I

Semester: II

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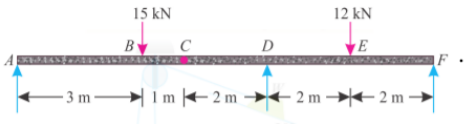
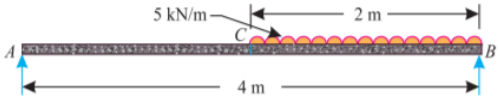
9. **Target : 60%** — **P: 0**, **C: 4**

	self-weight of the frame and using the method of virtual work, find magnitudes of the thrust in the member BD.			
Part F (Application Based Questions) (5-10 marks each)				
1.	A simply supported beam AB of span 4 m is subjected to a point load of 10 kN at a distance of 1.5 m from A. Using the principle of virtual work, determine the reactions at the two supports.	**Easy**	**Ap**	**4**
2.	Two beams AD and DF of spans 6m and 4m respectively are hinged at C and supported at A, D and F. The beams are loaded as shown in Fig. Using the principle of virtual work, find the reaction at D 	**Medium**	**Ap**	**4**
3.	A simply supported beam of span 4 m is carrying a uniformly distributed load of 5 kN/m as shown in Fig. Using the principle of virtual work, find the reactions at A and B. 	**Difficult**	**Ap**	**4**
Part G (Short Notes) (5 marks each)				
1.	Virtual Work for Beam Problem	**Easy**	**U**	**4**
2.	Virtual Work for Lifting Machine	**Medium**	**U**	**4**
3.	Vartual Work for Ladder	**Difficult**	**U**	**4**

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
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9. **Target : 60%** — **P: 0**, **C: 4**

Part A (Multiple Choice Questions) (1 mark each)				
1.	The time of flight of a projectile on a horizontal plane is (a) 2u sinα/g (b) 2ucosα/g (c) 2u sinα/2g (d) u cos 2α/2g	**Easy**	**U**	**5**
2.	The horizontal range of a projectile is maximum when the angle of projectile is (a) 30° (b) 45° (c) 60° (d) 75°	**Medium**	**R**	**5**
3.	The time of flight of a projectile on an upward inclined plane depends upon (a) angle of projection (b) angle of inclination of the plane (c) both 'a' and ' b' (d) none of the above	**Difficult**	**U**	**5**
	Part B (Definition/Naming Questions) (2 marks each)			
1.	What is a projectile? Give an example of a projectile.	**Easy**	**Ap**	**5**
2.	Define the terms: velocity of projection and angle of projection	**Medium**	**U**	**5**
3.	Obtain an equation for the trajectory of a projectile, and show that it is a parabola	**Difficult**	**R**	**5**
Part C (Short Questions) (3-4 marks each)				
1.	Derive an expression for the maximum height and range of a projectile traversed by a stone, thrown with an initial velocity of u and an inclination of α.	**Easy**	**R**	**5**
2.	At what angle, the projectile should be projected in order to have maximum range? Justify your answer by calculations.	**Medium**	**R**	**5**
3.	Derive a relation for the velocity and direction of motion of a projectile: (a) after a given interval of time t from the instant of projection. (b) at a given height h above the point of projection.	**Difficult**	**R**	**5**
Part D (Explanation Based Questions) (5 marks each)				
1.	How would you find out (a) time of flight (b) range of a projectile, when projected upwards on an	**Easy**	**Ap**	**5**

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
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9. **Target : 60%** — **P: 0**, **C: 4**

	inclined plane? What happens to the above equations, when the same projectile is projected on the same plane, but in a downward direction?			
2.	A bullet is fired at such an angle, over a horizontal plane, that its horizontal range is equal to its greatest height. Find the angle of projection	**Medium**	**R**	**5**
3.	Derive the equation of path of the projectile.	**Difficult**	**U**	**5**
Part E (Questions Based on Reasoning) (5 marks each)				
1.	Derive the equation of Maximum hight of a projectile on a horizontal range.	**Easy**	**Ap**	**5**
2.	Derive the equation of time of flight on a projectile in horizontal range.	**Medium**	**Ap**	**5**
3.	A particle is projected from the base of a hill whose shape is that of a right circular cone with axis vertical. The projectile grazes the vertex and strikes the hill again at a point on the base. If θ be the semi-vertical angle of the cone, h its height, u the initial velocity of the projectile and α the angle of projection measured from the horizontal, show that $\tan\alpha = 2\cot\theta$ and $u^2 = gh\left(2 + \frac{1}{2}\tan^2\theta\right)$. where g is acceleration due to gravity.	**Difficult**	**Ap**	**5**
Part F (Application Based Questions) (5-10 marks each)				
1.	A ball is projected upwards with a velocity of 15 m/s at an angle of 25° with the horizontal. What is the horizontal range of the ball?	**Easy**	**Ap**	**5**
2.	A bullet is fired with a velocity of 100 m/s at an angle of 45° with the horizontal. How high the bullet will rise?	**Medium**	**Ap**	**5**
3.	If a particle is projected inside a horizontal tunnel which is 5 metres high with a velocity of 60 m/s, find the angle of projection and the greatest possible range.	**Difficult**	**Ap**	**5**

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
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8. **Program : B.Tech** — **T: 1**
9. **Target : 60%** — **P: 0**, **C: 4**

Part G (Short Notes) (5 marks each)				
1.	Trajectory.	**Easy**	**U**	**5**
2.	Velocity of projection	**Medium**	**U**	**5**
3.	Angle of projection	**Difficult**	**R**	**5**

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

Evaluation Sheet – Internal Assessment

Roll Number	Registration Number	Name of the Student	Internal Assessment (30)				
			Assignment	Class Test	Case Study	etc.	Total

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

Evaluation Sheet – Mid Semester

Roll Number	Registration Number	Name of the Student	Marks (20)

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

Planning for Remedial Classes – Mid Semester

Sl. No.	Name of Student	Roll No.	Reg. No.	Mid Sem Marks	Remedial Classes Held							Class test on the basis of Remedial Classes	End Sem Marks	Improvement (Y/N)
					Date									
					Venue									
					Time									
1.														
2.														

Signature of HOD/ Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
8. **Program : B.Tech** — **T: 1**
9. **Target : 60%** — **P: 0**

C: 4

COURSE END SURVEY

INDIRECT ASSESSMENT

Sample format for Indirect Assessment of Course outcomes:

NAME:
ROLL NO.:
REG. NO..:
COURSE:
PROGRAM:

Please rate the following aspects of course outcomes of

Use the scale 1-5 (Poor – Excellent)

Course Outcomes	Statement	1	2	3	4	5
CO1						
CO2						
CO3						
CO4						
CO5						

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

INDIRECT ASSESSMENT CONSOLIDATION

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF
DEPARTMENT OF
CO Indirect Assessment

Programme: **Academic Year:2020-21**
Batch: 2020-22

Course Code & Name:

Course Outcome	Students Feed Back (5)	Attainment (100)
CO1		
CO2		
CO3		
CO4		
CO5		
etc.		

Signature of HOD/Dean
Date:

Signature of Faculty
Date:

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

Evaluation Sheet (End Semester)

Roll Number	Registration Number	Name of the Student	Marks (50)

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

Planning for Remedial Classes – End Semester

Sl. No.	Name of Student	Roll No.	Reg. No.	End Sem Marks	Remedial Classes Held							Class test on the basis of Remedial Classes	Supple Exam Marks	Improvement (Y/N)
					Date									
					Venue									
					Time									
1.														
2.														

Signature of HOD/ Dean

Date

Signature of Faculty

Date

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

Consolidated Mark Statement

Roll Number	Registration Number	Name of the Student	Total Marks			
			Mid Semester (20)	Internal Assessment (30)	End Semester (50)	Total (100)

Signature of Dean/HOD

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
8. **Program : B.Tech** — **T: 1**
9. **Target : 60%** — **P: 0**

C: 4

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

CO ATTAINMENT – GAP ANALYSIS & REMEDIAL MEASURES

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF
DEPARTMENT OF
CO ATTAINMENT - GAP ANALYSIS & REMEDIAL MEASURES

Batch :	2020-22		Academic Year: 2020-21
Course Code & Name		Name of the Coordinator	Year & Semester
			I & I

CO	Direct Assessment	Indirect Assessment	CO Attainment	Target	CO Attainment Gaps	Action for Bridge the Gap	Target Modification
CO1							
CO2							
CO3							
CO4							
CO5							

Signature of HOD/Dean — **Signature of Faculty**

Date: — **Date:**

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty
7. Course : Engineering Mechanics
8. Program : B.Tech
9. Target : 60%

Course Code: MEE11002

L: 3

T: 1

P: 0

C: 4

CO-PO ATTAINMENT

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF
DEPARTMENT OF
CO-PO ATTAINMENT

Programme :	Year & Sem: I & I	Academic Year: 2020-21	Batch:2020-22

Course Code	Course Name	CO-PO	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
		Relationship															
		Mapping Value															
		Attainment															

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Mr. Sudip Chakraborty — Course Code: MEE11002
7. Course : Engineering Mechanics — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

PO ATTAINMENT OF THE COURSE

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Mr. Sudip Chakraborty** — **Course Code: MEE11002**
7. **Course : Engineering Mechanics** — **L: 3**
8. **Program : B.Tech** — **T: 1**
9. **Target : 60%** — **P: 0**

C: 4