

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Two vectors A and B are given. Determine their cross product and the unit vector along it. $A = 2i + 3j + k$ and $B = 3i - 3j + 4k$.
2. Distinguish the following types of forces with suitable sketch :
(a) Collinear and (b) Co-planar.
3. State and explain Lami's theorem of triangle law of equilibrium.
4. Under what conditions do the following coincide :
(a) Centre of mass and Centre of gravity (b) Centre of gravity and Centroid of area.
5. What is the condition in terms of efficiency for a machine to be self-locking?
6. A particle, starting from rest, moves in a straight line and its acceleration is given by $a = 50 - 36t^2$ m/sec² where t is in sec. Determine the velocity of the particle when it has travelled 52 m.
7. A stone is dropped into a well and if the splash is heard 2.50 seconds later, determine the depth of water surface assuming that the velocity of sound is 330 m/sec.
8. Define the term co-efficient of restitution.
9. State the equation to determine the escape velocity of a satellite to escape from the gravitational field of earth.
10. How will you calculate the linear restoring force of an elastic material?

PART B — (5 × 16 = 80 marks)

11. A three-bar pendulum ABCD has three bars each 2 m in length and weighing 2.5 kN as shown in Figure 11. It is held in equilibrium by applying a horizontal force of 5 kN at the free end. Determine the angles θ_1 , θ_2 and θ_3 made with the vertical.



Figure 11

Engineering Mechanics Anna University Solved Problems

Jin-Ying Zhang



Engineering Mechanics Anna University Solved Problems:

Engineering Mechanics (For Anna) S. Rajasekaran & G. Sankarasubramanian, Mechanics is the fundamental branch of physics whose two offshoots static and dynamics find varied application in thermodynamics electricity and electromagnetism Engineering Mechanics is a simple yet insightful textbook on the concepts and principles of mechanics in the field of engineering Written in a comprehensive manner Engineering Mechanics greatly elaborates on the tricky aspects of the motion of particle and its cause forces and vectors lifting machines and pulleys inertia and projectiles juxtaposition them with relevant neat illustrations which make the science of engineering mechanics an interesting study for aspiring engineers The authors have packaged the book Engineering Mechanics with a huge number of theoretical questions numerical problems and a highly informative objective type question bank The book aspires to cater to the learning needs of BE BTech students and also those preparing for competitive exams

Physics and Mechanics of New Materials and Their Applications Ivan A. Parinov, Shun-Hsyung Chang, Arkady N. Soloviev, 2023-01-28 This book presents 50 selected peer reviewed contributions from the 10th Anniversary International Conference on Physics and Mechanics of New Materials and Their Applications PHENMA 2021 2022 23 27 May 2022 Divnomorsk Russia focusing on processing techniques physics mechanics and applications of advanced materials The book describes a broad spectrum of promising nanostructures crystal structures materials and composites with unique properties It presents nanotechnological design approaches environmental friendly processing techniques and physicochemical as well as mechanical studies of advanced materials The selected contributions describe recent progress in computational materials science methods and algorithms in particular finite element and finite difference modelling applied to various technological mechanical and physical problems The presented results are important for ongoing efforts concerning the theory modelling and testing of advanced materials Other results are devoted to promising devices with higher accuracy increased longevity and greater potential to work effectively under critical temperatures high pressure and in aggressive environments

5th Kuala Lumpur International Conference on Biomedical Engineering 2011 Hua-Nong Ting, 2011-06-17 The Biomed 2011 brought together academicians and practitioners in engineering and medicine in this ever progressing field This volume presents the proceedings of this international conference which was held in conjunction with the 8th Asian Pacific Conference on Medical and Biological Engineering APCMBE 2011 on the 20th to the 23rd of June 2011 at Berjaya Times Square Hotel Kuala Lumpur The topics covered in the conference proceedings include Artificial organs bioengineering education bionanotechnology biosignal processing bioinformatics biomaterials biomechanics biomedical imaging biomedical instrumentation BioMEMS clinical engineering prosthetics

Multifield Problems Anna-Margarete Sändig, W. Schiehlen, W.L. Wendland, 2000-06-15 The simulation of complex engineering problems often involves an interaction or coupling of individual phenomena which are traditionally related by themselves to separate fields of applied mechanics Typical examples of these so called multifield problems are the thermo mechanical analysis of solids

with coupling between mechanical stress analysis and thermal heat transfer processes the simulation of coupled deformation and fluid transport mechanisms in porous media the prediction of mass transport and phase transition phenomena of mixtures the analysis of sedimentation processes based on an interaction of particle dynamics and viscous flow the simulation of multibody systems and fluid structure interactions based on solid to solid and solid to fluid contact mechanisms

Engineering Mechanics : Vector And Classical Approach (For Anna University) S.S. Bhavikatti, 2003 This Book Meets The Complete Requirements Of Engineering Mechanics Course Of Anna University Tamil Nadu And Most Of The Universities Of India Emphasis Has Been On Vector Approach Which Is Ideally Suited For The Analysis Of Three Dimensional Problems However Classical Approach Gives Physical Feel Of The Structure And Ideally Suited For Two Dimensional Problems Hence This Approach Is Also Used And Explained Wherever Necessary In Engineering Mechanics Drawing Free Body Diagrams Is Very Important Hence In All The Problems In The Text Free Body Diagrams Are Drawn Neatly All Problems Are Solved Systematically Without Slipping Any Step So That The Reader Picks Up Correct Method Of Presenting Solution Standard Notations Are Used Throughout Commencement Program Iowa State University, 1988 **Catalog of Copyright**

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out problems Gives detailed solutions and hints to problems under Exercises Trends, Paradigms, and Advances in Mechatronics Engineering Mellal, Mohamed Arezki, 2022-11-18 Most modern systems involve various engineering disciplines Mechatronic systems are designed to be dependable and efficient however mechatronics engineering faces multiple challenges at the design and exploitation stages It is essential for engineers to be aware of these challenges and remain up to date with the emerging research in the mechatronics engineering field Trends Paradigms and Advances in Mechatronics Engineering presents the latest advances and applications of mechatronics It highlights the recent challenges in the field and facilitates understanding of the subject Covering topics such as the construction industry design optimization and low cost fabrication this premier reference source is a crucial resource for engineers computer scientists construction managers students and educators of higher education librarians researchers and academicians **25 Problems for STEM Education** Valery Ochkov, 2020-01-31 25 Problems for STEM Education introduces a new and emerging course for undergraduate STEM programs called Physical Mathematical Informatics This course corresponds with the new direction in education called STE A M Science Technology Engineering Art and Mathematics The book focuses on undergraduate university students and high school students as well as the teachers of mathematics physics chemistry and other disciplines such as the humanities This book is suitable for readers who have a basic understanding of mathematics and math software Features Contains 32 interesting problems studies and new and unique methods of solving these physical and mathematical problems using a computer as well as new methods of teaching mathematics and physics Suitable for students in advanced high school courses and undergraduates as well as for students studying Mathematical Education at the Master s or PhD level One of the only books that attempts to bring together ST E AM techniques computational mathematics and informatics in a single unified format

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