

**Fifth Semester B.E. Degree Examination, June/July 2014**  
**Design of Machine Elements - I**

Time: 3 hrs.

Max. Marks: 100

**Note:** 1. Answer FIVE full questions, selecting at least TWO questions from each part.  
 2. Use of design data handbook is permitted.

**PART - A**

1. a. Draw the stress-strain diagrams for a ductile material and a brittle material and show the salient points on them. (05 Marks)  
 b. For the stress-element shown in Fig.Q1(b), find the principal stresses and directions. (06 Marks)

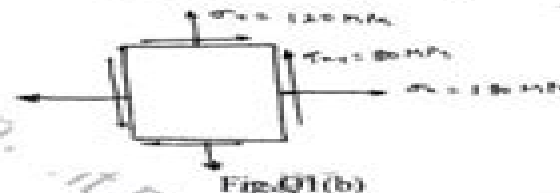


Fig.Q1(b)

- c. Determine the maximum normal stress and shear stress for the figure shown in Fig.Q1(c). (09 Marks)

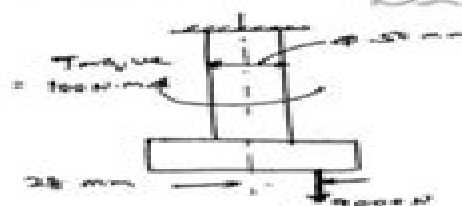


Fig.Q1(c)



Fig.Q2(b)

2. a. Explain the following theories of failure:  
 (i) Maximum shear stress theory (ii) Distortion energy theory. (05 Marks)  
 b. A flat plate subjected to a tensile force of 5 kN is shown in Fig.Q2(b). The plate material is grey cast iron having  $\sigma_{ultimate} = 200$  MPa. Determine the thickness of the plate. Factor of safety is 2.5. (08 Marks)  
 c. A weight 600 N drops through a height of 20 mm and impacts the center of 300 mm-long simply supported circular cross section beam. Find the diameter of the beam and the maximum deflection, if the allowable stress is limited to 90 MPa. Neglect the inertia effect and take  $E = 200$  GPa. (07 Marks)
3. a. Derive Soderberg's equation for ductile material. (05 Marks)  
 b. A hot rolled steel rod is subjected to a torsional load that varies from +330 N-m clockwise to 110 N-m counter clockwise and an applied bending moment varies from +440 N-m to -220 N-m. The rod is of uniform cross-section. Determine the required rod diameter. The material has an ultimate tensile strength of 550 MPa and a yield strength of 410 MPa. Design based on a factor of safety of 1.5. Take the endurance limit as half the ultimate strength. (15 Marks)

# Grade 1 mechanical Technology exam June 2014

**K Morrison**



## **Grade 1mechanical Technologyexam June 2014:**

*Information Technology and Applications* Xiaolong Li,2015-04-07 Information Technology IT is the application of computers and telecommunications equipment to store retrieve transmit and manipulate data often in the context of a business or other enterprise IT has become one of the most fundamental technologies in today s social life and there are many unsolved issues related to IT and its applications Th

**Daily Graphic** Ransford Tetteh,2014-03-29 *The Proceedings of the 2018 Asia-Pacific International Symposium on Aerospace Technology (APISAT 2018)* Xinguo Zhang,2019-06-08 This book is a compilation of peer reviewed papers from the 2018 Asia Pacific International Symposium on Aerospace Technology APISAT 2018 The symposium is a common endeavour between the four national aerospace societies in China Australia Korea and Japan namely the Chinese Society of Aeronautics and Astronautics CSAA Royal Aeronautical Society Australian Division RAeS Australian Division the Korean Society for Aeronautical and Space Sciences KSAS and the Japan Society for Aeronautical and Space Sciences JSASS APISAT is an annual event initiated in 2009 to provide an opportunity for researchers and engineers from Asia Pacific countries to discuss current and future advanced topics in aeronautical and space engineering

**International Gear Conference 2014: 26th-28th August 2014, Lyon** Philippe Velex,2014-09-18 This book presents papers from the International Gear Conference 2014 held in Lyon 26th 28th August 2014 Mechanical transmission components such as gears rolling element bearings CVTs belts and chains are present in every industrial sector and over recent years increasing competitive pressure and environmental concerns have provided an impetus for cleaner more efficient and quieter units Moreover the emergence of relatively new applications such as wind turbines hybrid transmissions and jet engines has led to even more severe constraints The main objective of this conference is to provide a forum for the most recent advances addressing the challenges in modern mechanical transmissions The conference proceedings address all aspects of gear and power transmission technology and range of applications aerospace automotive wind turbine and others including topical issues such as power losses and efficiency gear vibrations and noise lubrication contact failures tribo dynamics and nano transmissions A truly international contribution with more than 120 papers from all over the world A judicious balance between fundamental research and industrial concerns Participation of the most respected international experts in the field of gearing A wide range of applications in terms of size power speed and industrial sector

**Electric Flight Technology** Ravi Rajamani,2018-05-28 The environmental impact of hydrocarbon burning aircraft is one of the main motivations for the move to electric propulsion in aerospace Also cars buses and trucks are incorporating electric or hybrid electric propulsion systems reducing the pressure on hydrocarbons and lowering the costs of electrical components The economies of scale necessitated by the automotive industry will help contain costs in the aviation sector as well The use of electric propulsion in airplanes is not a new phenomenon However it is only recently that it has taken off in a concrete manner with a viable commercial future The Electric Flight Technology Unfolding of a New

Future reviews the history of this field discusses the key underlying technologies and describes how the future for these technologies will likely unfold distinguishing between all electric AE and hybrid electric HE architectures Written by Dr Ravi Rajamani it covers the essential information needed to understand this new technology wave taking hold in the aerospace industry The Electric Flight Technology Unfolding of a New Future covers fundamental topics such as The history of electric propulsion including its evolution from using traditional electricity to solar power to batteries as sources to sustain propulsion and flight The various architectures being considered for electric aircraft specifically small general aviation GA aircraft and larger business jets single aisle commercial aircraft and larger twin aisle commercial aircraft The various systems and subsystems of an electric aircraft along with how various subsystems in the vehicle can be integrated in a more optimal manner In the future the existing tube and wing configuration will not be the only available architecture instead we will be more likely to find an architecture where the propulsion system is embedded within the airframe The future trends in this arena and what we can expect to see in the next decade or so *Advanced Materials Science III* Sarjito,,Waluyo Adi Siswanto,Tri Widodo Besar Riyadi,2021-05-04 Selected peer reviewed full text papers from the 3rd International Conference on Advanced Materials Science ICOAMS 2020 Selected peer reviewed papers from the 3rd International Conference on Advanced Materials Science ICOAMS 2020 December 8 9 2020 Surakarta Indonesia [Ships and Offshore Structures XIX](#) Carlos Guedes Soares,Y. Garbatov,2015-09-03 This three volume work presents the proceedings from the 19th International Ship and Offshore Structures Congress held in Cascais Portugal on 7th to 10th September 2015 The International Ship and Offshore Structures Congress ISSC is a forum for the exchange of information by experts undertaking and applying marine structural research The aim of *200 technical questions and answers for job interview Offshore Oil & Gas Platforms* Petrogav International Oil & Gas Training Center,2020-06-30 The job interview is probably the most important step you will take in your job search journey Because it s always important to be prepared to respond effectively to the questions that employers typically ask at a job interview Petrogav International has prepared this eBooks that will help you to get a job in oil and gas industry Since these questions are so common hiring managers will expect you to be able to answer them smoothly and without hesitation This eBook contains 200 questions and answers for job interview and as a BONUS web addresses to 200 video movies for a better understanding of the technological process This course covers aspects like HSE Process Mechanical Electrical and Instrumentation Control that will enable you to apply for any position in the Oil and Gas Industry

**Opening the Great Depths** Norman C Polmar, Lee J Mathers, 2021-05-15 Developed by French physicist Auguste Piccard and his son Jacques the bathyscaph Trieste was a scientific marvel that allowed unprecedented scientific technical and military feats in the ocean depths France and the United States both acquired and subsequently developed variants of the original bathyscaph While both France and the United States employed the bathyscaph as a tool for scientific investigation of the deepest ocean depths the U S Navy developed and employed the Trieste for military missions as well

From its earliest years participants in the Trieste program realized that they were making history blazing a trail into previously unexplored and unexploited depths developing new capabilities and opening a new frontier Comparisons with developments in space and the space race between the United States and the Soviet Union often were made concerning the Trieste program and contemporary developments in undersea technologies and capabilities The Trieste opened the entire oceans to exploration exploitation and operations The bathyscaph was a first generation system a Model T that spawned an entirely new industry and encouraged new concepts for deep ocean naval operations Advances in deep sea technologies lacked the gee whiz factor of the concurrent space race but were highly significant in the development of new technology new knowledge and new military capabilities Opening the Great Depths is the story of the three Trieste deep ocean vehicles their officers and enlisted men and the civilians often told in their own words documenting for the first time the earliest years of humanity s probing into Earth s final frontier

*Handbook of Concentrator Photovoltaic Technology* Carlos  
Algora, Ignacio Rey-Stolle, 2016-04-25 Concentrator Photovoltaics CPV is one of the most promising technologies to produce solar electricity at competitive prices High performing CPV systems with efficiencies well over 30% and multi megawatt CPV plants are now a reality As a result of these achievements the global CPV market is expected to grow dramatically over the next few years reaching cumulative installed capacity of 12.5 GW by 2020 In this context both new and consolidated players are moving fast to gain a strategic advantage in this emerging market Written with clear brief and self contained technical explanations *Handbook of Concentrator Photovoltaic Technology* provides a complete overview of CPV covering the fundamentals of solar radiation solar cells concentrator optics modules and trackers all aspects of characterization and reliability case studies based on the description of actual systems and plants in the field environmental impact market potential and cost analysis CPV technology is at a key point of expansion This timely handbook aims to provide a comprehensive assessment of all CPV scientific technological and engineering background with a view to equipping engineers and industry professionals with all of the vital information they need to help them sustain the impetus of this encouraging technology Key features Uniquely combines an explanation of the fundamentals of CPV systems and components with an overview of the market place and their real life applications Each chapter is written by well known industry specialists with extensive expertise in each particular field of CPV technology Reviews the basic concepts of multi junction solar cells and new concepts for CPV cells highlighting the key differences between them Demonstrates the state of the art of several CPV centres and companies Facilitates future cost calculation models for CPV Features extensive case studies in each chapter including coverage of CPV modules and systems

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