

103 年度第 1 次研究生入學能力考試試題

科目： 英文

考試日期： 103 年 8 月 2 日

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第一部份：閱讀測驗題(單選題)(有三篇短文，共 12 題，每題 5 分，共 60 分)

[請依據短文之內容答題]

第一篇短文：

Mechanical engineers are dealing with the product, production and processing of energy and with providing the tools of design, the means of production, and the techniques of automation. The skill and knowledge base are extensive which may include mechanics of solids and fluids, thermal science, mass and momentum transport, manufacturing processes, and control technique.

To design a gear train which is often used for power transmission involves mechanics, strength of material, mechanism, fluid dynamics, heat transfer, material selection, machining, measurement, and so on. The development of internal combustion engine and jet engine involve more fundamental science and technology, such as thermodynamics, combustion, machine design, vibration, sound, control, manufacturing and system engineering.

1. The scope of mechanical engineers can handle?
 - (1) Analyze the temperature distribution of a gear train,
 - (2) Make tools to produce automotive components,
 - (3) Develop automation technique to assemble internal combustion engine,
 - (4) All above are correct.
2. The power transmission using gear train does NOT involve following knowledge?
 - (1) Strength of material,
 - (2) Combustion,
 - (3) Fluid dynamics,
 - (4) Heat transfer.
3. When we develop a new internal combustion engines, which group of fundamental expertise has a higher priority need?
 - (1) Use bolt screws to assemble the engine cover and engine cylinder together,
 - (2) Inspection and measurement of engine efficiency,
 - (3) Thermodynamics, combustion and machine design,
 - (4) Design robot arms to assemble the engine automatically.
4. Mechanical engineers often are responsible for system integration. Which is NOT a correct statement?
 - (1) Mechanical engineers have extensive expertise in machine design and manufacturing,

- (2) Mechanical engineers have broad expertise in combustion in automobile technology,
- (3) Mechanical engineers have expertise in both thermal science and chemical chain reaction,
- (4) Mechanical engineers may have skill to develop hard disk drive.

第二篇短文:

The outstanding characteristics of aluminum and its alloys are their strength-weight ratio, their resistance to corrosion, and their high thermal and electrical conductivity. The density of aluminum is about $2,770 \text{ kg/cm}^3$, compared with $7,750 \text{ kg/cm}^3$ for steel. Pure aluminum has a tensile strength of about 90 MPa, but this can be improved considerably by cold working and also by alloying with other materials. The modulus of elasticity of steel is approximately 210 GPa, which is about three times of that of aluminum.

Considering the cost and strength of aluminum and its alloys, they are among the most versatile materials from the standpoint of fabrication. Aluminum can be processed by mold casting, hot or cold working, or extruding. Its alloys can be machined, press-worked, soldered, or welded. Pure aluminum melts at 660°C which makes it very easy for the production of either permanent or sand mold castings. It is commercially available in the form of plate, bar, sheet, foil, rod, and tube and in structural and extruded shapes.

5. By adding some materials into pure aluminum is to improve main property of
 - (1) Tensile strength,
 - (2) Density,
 - (3) Cold working,
 - (4) Size.
6. What will be the estimated modulus of elasticity of aluminum?
 - (1) 70 GPa,
 - (2) 140 Gpa,
 - (3) 210 Gpa,
 - (4) Difficult to estimate.
7. Comparing the strength-weight ratio (SWR) of aluminum with that of steel, what is the correct statement? Note that the SWR is the ratio of the modulus of elasticity divided by its density.
 - (1) Aluminum SWR is about one-third of steel SWR,
 - (2) Aluminum SWR is about one-half of steel SWR,
 - (3) Aluminum SWR is about same as steel SWR,
 - (4) Aluminum SWR is about 2 times of steel SWR.
8. The reason of aluminum can be commercially available in many different shapes is

- (1) Its thermal conductivity is relatively low,
- (2) Its density is relatively low,
- (3) Its melting point is relatively low,
- (4) Its cost is relatively low.

第三篇短文：

Gears are used to transmit torque, rotary motion and power from one shaft to another. They have a long history. In about 2600 B.C., the Chinese used primitive gear-sets, most likely made of wood, their teeth merely rods inserted in wheel. In the 15th century A.D., Leonardo da Vinci showed many gear arrangements in his drawings. Presently, a wide variety of gear types have been developed that operate quietly and with very low friction losses. Smooth, low vibration action is possible by giving the proper geometric profile of the tooth.

Compared to various other devices of power transmission, such as belts and chains, gears are the most rugged and durable. They have higher transmission efficiency. However, gears are generally more costly than belts and chains.

9. The reason that gears are often used to transmit the power includes

- (1) Being used by ancient Chinese,
- (2) Durable behavior,
- (3) Easy to use,
- (4) Can use wood.

10. The reason of smooth and quiet motion using gear-sets is?

- (1) Gears have different sizes,
- (2) Proper geometric profile of the gear tooth,
- (3) Leonardo da Vinci invented,
- (4) Gears have teeth.

11. To transmit the power from one shaft to another, we can use

- (1) Gears,
- (2) Belts,
- (3) Chains,
- (4) All above are correct.

12. Why gears are better than belts and chains?

- (1) Gears have been used for a long time,
- (2) Gear transmission is famous,
- (3) Gear transmission is efficient,
- (4) Gears are easy to maintain.

**第二部份：翻譯題(英翻中試題)，請翻譯英文為中文
(共 2 題，每題 20 分，共 40 分)**

1. The design of a machine or a machine component is frequently accomplished through a series of process stages. These stages carry the design from the concept to completion. The feasibility stage is the first process that determines whether the design concept is possible to be successful. The idea generated during this stage is an overall concept rather than a detailed engineering specification. Based on technical assessment, the output of this stage will generally be a recommendation either to proceed or to stop the project.
2. The term hardness is used to designate certain mechanical properties of a material. It is related to the resistance to penetration, scratch, abrasion or cutting. The hardness can be specified by numbers which are measured by different testing instruments. The hardness of materials can be changed through different operations such as heat treatment, mechanical work, or other techniques. Among many hardness testing instruments, the Rockwell machine is widely used in industry to measure the hardness.