

Term exam (English III)

クラスは 01(機械), 02(電気), 03(制御), 04(情報)を, 出席番号は 001- 050 をマークすること。
 クラス・番号・名前を文字で枠の中にも書いておくこと。

A. Fill in the blanks.

A major consideration in engineering design is maintenance. One of the commonest causes of failure in the long term is (1). This is any deterioration in the component's appearance or physical properties.

Corrosion covers a number of processes whereby a metal changes state as a result of some form of interaction with its (2). It often occurs where water, either as a liquid or vapour in air of high humidity, is present.

In general, corrosion becomes worse when impurities are present in damp conditions. It never starts inside a material, and there will always be (3) evidence that indicates corrosion exists, (4) close examination may be needed.

A common (5) of corrosion is the rusting of steel where a conversion of metallic iron to a mixture of oxides and other compounds occurs. This not only changes the appearance of the metal but also (6) in a decrease in its cross-section.

It is imperative that a design takes into (7) whether a material will be affected in a particular environment and, if corrosion is likely, at what (8).

Many factors can intervene in a way to restrain its progress. An example is aluminium and its (9) which perform satisfactorily in many engineering and domestic applications when exposed to air and water. This is due to the rapid production of a tough adherent film of (10) which protects the metal from further attack so that corrosion halts.

Words:

- | | |
|-----------------|---------------|
| [1] alloys | [6] results |
| [2] environment | [7] corrosion |
| [3] account | [8] example |
| [4] although | [9] surface |
| [5] rate | [0] oxide |

B. Fill in the blanks.

A MAGLEV (magnetic levitation) train does not run along a track in the normal way. Instead, magnetic fields lift it above the track (11) that the train 'floats' along.

Because they have no wheels, axles, suspension, dampers, or brakes, Maglev vehicles are light and compact. They are also pollution-free, as no (12) is burned within the train, and cheap to maintain.

The Maglev system at Birmingham Airport carries passengers from the terminal to the railway station and the National Exhibition Centre. The cars are made (13) lightweight fiberglass, carried on an aluminium chassis.

All the electrical (14) which powers the cars is situated under the floors or the seats. Each car can take 32 passengers and their luggage, up to a weight of 3 tonnes. The trains travel at a maximum speed of 42 km/h.

A concrete guideway above the ground supports a T-shaped track for the two-car Maglev trains. The train is lifted from the track by magnetic (15). This is the force by which two opposite magnetic poles attract each other (just as two of the same poles (16) each other). Powerful electromagnets at each corner of the train exerts a pulling force which lifts the train upwards so that it floats 15 mm above the track.

As people get on and off, the weight of the train (17). It may drop closer to the track than the required 15 mm, or rise further from it. To keep it at an (18) distance from the track, the force is varied by a microprocessor.

Each train is driven by an electric motor called a linear induction motor. Electromagnetic (19), or coils, on the train generate a magnetic field in which the magnetic poles shift along the train. The field induces electric current in the track, which (20) turn generates its own magnetic field. The Two fields in the track and the train interact so that the shifting field pulls the floating train along the track.

Words:

- | | |
|----------------|-------------|
| [1] attraction | [6] even |
| [2] varies | [7] so |
| [3] fuel | [8] of |
| [4] in | [9] repel |
| [5] equipment | [0] winding |

C. Fill in the blanks.

The consumer society produces more and more refuse. A (21) of solutions to this problem have been proposed. In some countries refuse is burnt to generate electric power. In Germany, producers must take back unwanted packaging for recycling. In other countries, householders are asked to separate out refuse so that it can be recycled more easily. This text describes an (22) plant in Holland designed to recycle domestic refuse.

The rubbish collected from households (23) of a mixture of organic materials such as kitchen waste, and inorganic materials such as glass and plastic bottles, tin cans, and packaging.

The rubbish is first passed through a hammer mill to shred it. The mill consists of rotating steel arms which break up any large items to reduce them to a more (24) size. Any items which may cause damage later in the process are rejected at this stage.

The shredded mixture passes under an (25) which removes ferrous metals. Much of this is tin cans. Almost all ferrous metals are recovered in this way.

After that, the (26) is carried by conveyor belt to an air classifier. A stream of air is blown through the classifier, which has a zig-zag shape. Low density materials such as plastic, paper, and some organic substances (27) to the top of the classifier. Higher density materials such as glass and non-ferrous metals fall to the bottom and are discarded. These could be further separated out using a range of processes. For example, an eddy current mechanism could screen out aluminium waste. Froth floatation techniques (28) recover glass.

The low density portion is carried to a rotating drum where it is screened. Fine organic materials pass through the screen leaving a mixture which consists mainly of plastic and paper. The organic residue can be used for compost or to make bricks.

The next stage is to separate the plastic from the paper. This was initially a problem as both are similar in (29). The solution is to wet the mixture. The paper absorbs water and as a result becomes denser than the plastic.

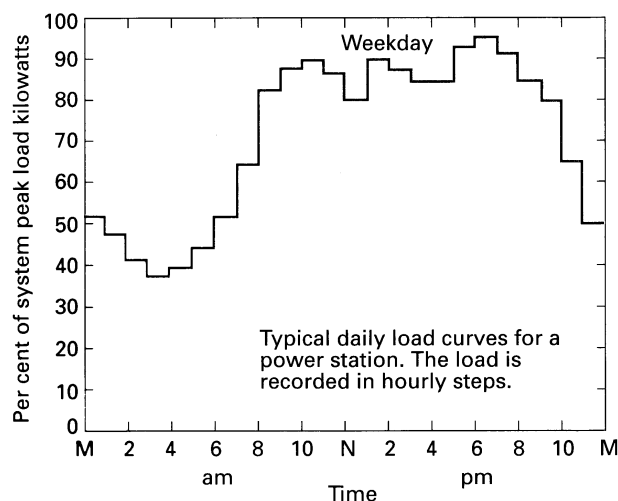
In the final stage, the wetted mixture is passed through a second air-classifier where the lighter plastic leaves from the top and the denser wet paper from the bottom. The recovered paper could be fed to pulp mills for further recycling.

The remaining plastic is a mixture of thermosets and thermoplastics. It is not easy to separate these out but the mixture can be melted and formed into (30) materials for building.

Words:

- | | |
|-------------------|----------------|
| [1] rise | [6] insulating |
| [2] experimental | [7] residue |
| [3] electromagnet | [8] number |
| [4] density | [9] manageable |
| [5] consists | [0] could |

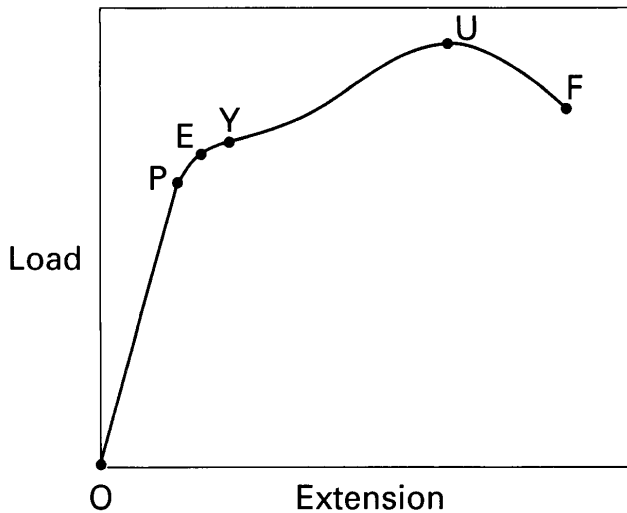
D. Choose the correct(正しい) sentences below:



- (31) The peak load is between
 [1] 3 a.m. and 4 a.m..
 [2] 6 p.m. and 7 p.m..
 [3] noon and midnight.
 [4] 8 a.m. and 9 a.m..
- (32) The load is 65% of capacity between
 [1] 7 a.m. and 8 a.m..
 [2] 9 a.m. and 10 a.m..
 [3] 3 p.m. and 4 p.m..
 [4] 5 p.m. and 6 p.m..
- (33) Between 7 a.m. and 9 a.m.,
 [1] the load falls slightly
 [2] the load falls sharply
 [3] the load rises slightly
 [4] the load rises sharply
- (34) Between 10 p.m. and midnight,
 [1] the load falls slightly
 [2] the load falls sharply
 [3] the load rises slightly
 [4] the load rises sharply
- (35) Between 3 p.m. and 5 p.m.,
 [1] the load falls
 [2] the load falls sharply
 [3] the load rises
 [4] the load remains constant

(continued overleaf)

E. Choose the correct words.



From O to P the specimen extends in direct (36) to the load applied.

- [1] proportion [2] property
[3] order [4] arrange

After P, the material reaches its (37), marked on the graph as point E.

- [1] elastic limit [2] waisting
[3] yield point [4] fracture

From Y there is a rapid increase in (38) for each increase in load

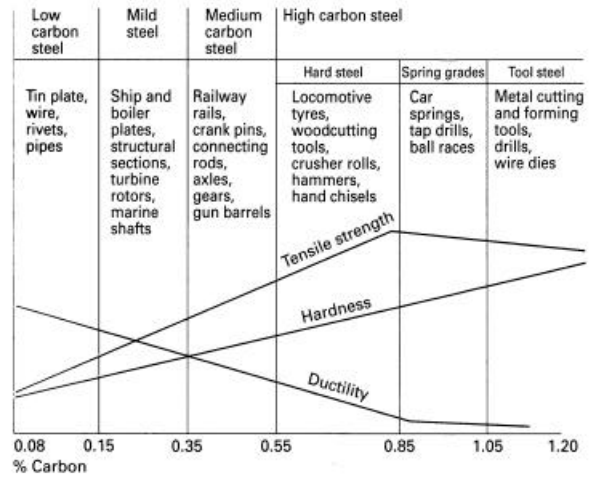
- [1] load [2] strength
[3] extension [4] length

This rapid extension continues until point U, the (39) is reached.

- [1] minimum load [2] maximum load
[3] yield point [4] elastic limit

After U the specimen lengthens further but the load (40).

- [1] rises [2] falls
[3] remain constant [4] fractures



Properties and applications of carbon steels

Steel which contains more than (41) carbon is called high carbon steel.

- [1] 0.15%
[2] 0.35%
[3] 0.55%
[4] 0.85%

Tool steel contains (42) carbon.

- [1] more than 1.05%
[2] less than 1.05%
[3] more than 1.20%
[4] less than 0.55%

Mild steel is more (43) than hard steel

- [1] fragile
[2] strong
[3] ductile
[4] hard

Low carbon steel is less (44) than medium carbon steel.

- [1] fragile
[2] elastic
[3] ductile
[4] hard

Car springs are made from (45).

- [1] Low carbon steel
[2] Mild steel
[3] Hard steel
[4] Spring grades

F: Put into Japanese (日本語に下さい):

(46) rust

- | | | | |
|-----|----|-----|------------------------|
| [1] | かび | [2] | 湿度 <small>しつど</small> |
| [3] | さび | [4] | 水分 <small>すいぶん</small> |

(47) domestic appliances

- | | | | |
|-----|-------------------------------------|-----|---------------------------------------|
| [1] | 家庭用電化製品 <small>かていようでんかせいひん</small> | [2] | 工業用電化製品 <small>こうぎようようでんかせいひん</small> |
| [3] | 家庭用掃除機 <small>かていようそうじき</small> | [4] | 家庭用洗濯機 <small>かていようせんたくき</small> |

(48) electromagnetic induction

- | | | | |
|-----|-----------------------------|-----|------------------------------|
| [1] | 電子レンジ <small>でんし</small> | [2] | 電波少年 <small>でんぱしょうねん</small> |
| [3] | 電磁誘導 <small>でんじゆうどう</small> | [4] | 電磁波 <small>でんじは</small> |

(49) nonferrous

- | | | | |
|-----|-----------------------------|-----|----------------------------|
| [1] | 非鉄金属 <small>ひてつきんぞく</small> | [2] | 鉄類 <small>てつるい</small> |
| [3] | 軽金属 <small>けいきんぞく</small> | [4] | 重金属 <small>じゅうきんぞく</small> |

(50) brick

- | | | | |
|-----|------------------------|-----|-----|
| [1] | 紙パック <small>かみ</small> | [2] | ブリキ |
| [3] | お菓子 <small>かし</small> | [4] | レンガ |