

# 國立中山大學 104 學年度碩士暨碩士專班招生考試試題

科目名稱：工程英文【機電系碩士班丁組】

題號：438001

※本科目依簡章規定「不可以」使用計算機(混合題)

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I. 選擇題 You are to choose the word, phrase or selection that best completes the sentence or meets the meaning of the condition. Then, on your answer sheet, find the number of the question and mark your answer. (27% in total, 3% each, 單選, 共 27 分, 每題 3 分)

1. ( ) is used to relate displacement, velocity, acceleration, and time, without reference to the cause of the motion. Choose the correct word between ( ). (a) Kinetics. (b) Kinematics. (c) Newton's law. (d) Statics.

2. In a game of pool, Fig. 1, ball A is moving with a velocity  $v_0$  when it strikes balls B and C, which are at rest and aligned as shown. After the impact, what is true about the overall center of mass of the system of three balls? (a) The overall system center of gravity (CG) will move in the same direction as  $v_0$ . (b) The overall system CG will stay at a single, constant point. (c) There is not enough information to determine the CG location. (d) None of the above.

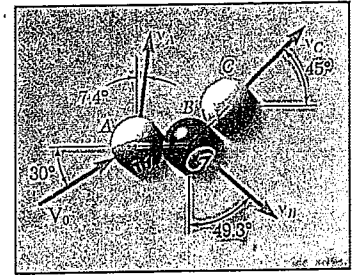


Fig. 1

3. The thin pipe P and the uniform cylinder C have the same outside radius and the same mass as shown in Fig. 2. If they are both released from rest, which of the following statements is true? (a) The pipe P will have a greater acceleration. (b) The cylinder and pipe will have the same acceleration. (c) The cylinder C will have a greater acceleration. (d) None of the above.

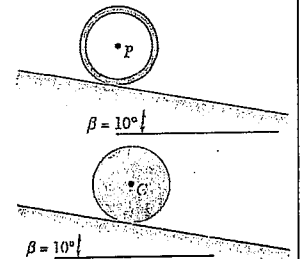


Fig. 2

4.  $e = \frac{\bar{u}_n - \bar{v}_n'}{\bar{v}_n - \bar{u}_n}$ ;  $e = \frac{w_0 - w_a}{w - w_0}$

Above equations, multiplying by  $r$  the numerator and denominator of the second expression obtained for  $e$ , and adding respectively to the numerator and denominator of the first expression, we have

(a)  $e = \frac{\bar{u}_n + rw_0 - (\bar{v}_n' + rw_a)}{\bar{v}_n + rw - (\bar{u}_n + rw_0)}$ ; (b)  $e = \frac{\bar{u}_n + rw_0 - (\bar{v}_n' + w_a)}{\bar{v}_n + rw - (\bar{u}_n + w_0)}$ ; (c)  $e = \frac{\bar{u}_n + w_0 - (\bar{v}_n' + w_a)}{\bar{v}_n + rw - (\bar{u}_n + rw_0)}$ ;

(d)  $e = \frac{r\bar{u}_n + w_0 - (r\bar{v}_n' + w_a)}{r\bar{v}_n + w - (r\bar{u}_n + w_0)}$ .

5. What is the symbol (Fig. 3) in engineering graphics? (a) First-angle projection. (b) Second-angle projection. (c) Third-angle projection. (d) Forth-angle projection.

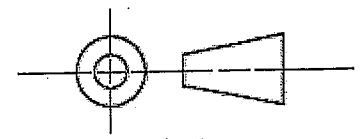


Fig. 3

6. What is the appropriate name of the component in Fig. 4? (a) Fillet. (b) Round. (c) Neck. (d) Chamfer.



Fig. 4

7. The distortion-energy theory originated from the observation that ductile materials stressed hydrostatically exhibited yield strengths greatly in excess of the values given by the simple tension test. The distortion-energy theory is also called: (a) Maximum stress theory. (b) Von Mises theory. (c) Maximum shear stress theory. (d) Modified Mohr theory.

8. A shaft is a rotating member, usually of circular cross section, used to transmit power or motion. When a shaft is used in static or quasi-static condition, what the following items is not concerned? (a) Material selection. (b) Vibration due to natural frequency. (c) Geometric layout. (d) Stress and strength.

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9. Which one is brittle material? (a) Low carbon steel. (b) Aluminum. (c) Cast iron. (d) Polypropylene.

II. Describe the variation of the lines in the below figure in English. The following Chinese sentences describing the figure are for your reference. 參考下圖與中文內容，將中文內容翻譯成英文，寫於答案紙上。(本題 23 分)

下圖 5 顯示穩態時(steady state)的最大擺動角度(swing angle)，隨著不同的  $L^*$  與車輪轉速的變化，當阻尼常數(damping constant,  $C_7$ )為 0.8 N-s/kg/m 時。當  $L^*$  等於 0.203 m 時，滿足  $L^*=R_2$  的條件，擺動角度會隨著不同的車輪轉速而連續性地變化。相較於其他情況，當  $L^*>R_2$  時的最大擺動角度小於當  $L^*=R_2$  時的最大擺動角度，這表示當  $L^*>R_2$  時功率會下降。當  $L^*<R_2$  時的最大擺動角度在超過臨界(critical)車輪轉速時會出現不連續的突跳(sudden discontinuous jump)。舉  $L^*=0.190$  m 為例，隨著車輪轉速增加，最大擺動角度在到達 a 點以前會緩慢地逐漸減少，之後車輪轉動頻率增加一點角度就會掉落到很小的值，如 b 點所示。圖中 a 點與 b 點間的狹小區域是不穩定的，超過 b 點之後，最大擺動角度的值會持續連續性的減少。經由以上的結果，當  $L^*$  完全等於  $R_2$  時，穩定的輸出功率會被呈現於各種車速之下，這證明了使用良好配重單擺(well-weighted)的優勢。

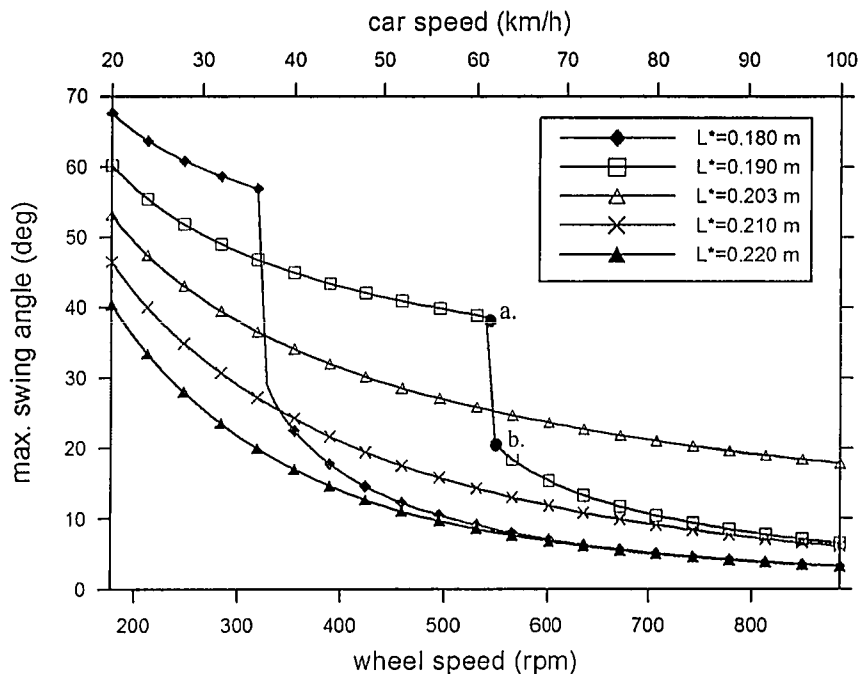


Fig. 5 Variation of the steady-state swing angle under various  $L^*$  and wheel speeds.

III. 英翻中(共 17 分) 請寫於答案紙上

Welding processes are divided into three basic categories: (a) fusion welding, (b) solid-state welding, and (c) brazing and soldering. Fusion welding: two (or more) parts are coalesced at their contacting surfaces by means of heat and/or pressure; filler metals may or may not be used. The basic processes in this category are arc, resistance, oxyfuel gas, electron beam, and laser beam welding. The welded joint undergoes important metallurgical and physical changes, which, in turn, have a major effect on the properties and performance of the welded component. In solid-state welding, joining takes place without fusion; consequently, there is no liquid (molten) phase in the joint. The basic processes in this category are diffusion bonding, and cold, ultrasonic, friction, and explosion welding. Brazing uses filler metal metals and involves lower temperatures than welding. Soldering uses similar filler metals (solders) and involves even lower temperatures.

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IV. Questions 簡答題，回答下列問題，並寫在答案紙上，可以中文或英文回答。

第一題至第六題每題 2 分，第七題至第十三題每題 3 分，共 33 分

1. What is the meaning of the term "machine tool"? (2%)
2. What is the meaning of the term "tensile strength of a material"? (2%)
3. What is the meaning of the term "work hardening of a metal"? (2%)
4. What is the meaning of the term "tolerance"? (2%)
5. What is the meaning of the term "surface finish" in manufacturing processes? (2%)
6. What is the meaning of the term "chill" in casting? (2%)
7. What are the meaning of the terms "pattern and core" in sand molding? (3%)
8. What is the meaning of the term "eutectic alloy"? Give an example. (3%)
9. What are a consumer good and a capital good? Give an example in each category. (3%)
10. In manufacturing processes, what is the meaning of the term "assembly operation"? Give an example. (3%)
11. In manufacturing processes, what are net shape processes and near net shape processes? (3%)
12. What are the primary, secondary, and tertiary industries? Give an example in each category. (3%)
13. State Hooke's law. Give an equation and explain your variables in this equation. (3%)