

考試科目	開課系級	考試日期	印製份數	答案紙	命題教師	備註
工程數學一	二 A	12 月 26 日		<input checked="" type="checkbox"/> 需 <input type="checkbox"/> 不需	陳桂鴻 呂學育	第三次大考

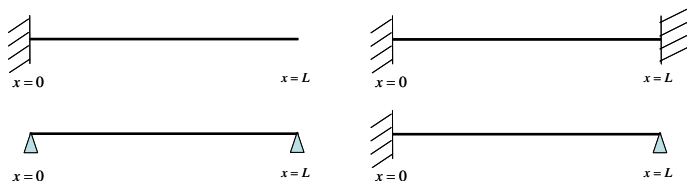
學生可帶 書本 計算機 其他\_\_\_\_\_ 皆不可

共 1 頁, 第 1 頁

1. A beam with flexural rigidity  $EI$  and length  $L$  is subject to the load per unit length  $w(x)$

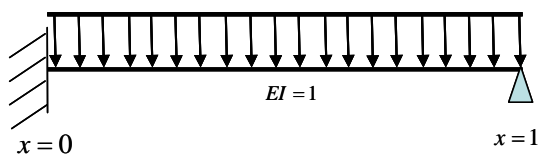
(1) Show that the differential equation of the deflection is  $EI \frac{d^4 y(x)}{dx^4} = w(x)$ . 7%

(2) Write the boundary conditions as follows 8%



(3) When the beam is embedded at its left end and simply supported at its right end and

$EI = 1$ ,  $w(x) = 1$ ,  $L = 1$ , as follows:  
 $w(x) = 1$



Find the deflection of the beam by using

- (a) the method of undermined coefficients 8%
- (b) Taylor series expansion method 10%
- (c) Power series with recurrence relation 10%

2. Given differential equation as follows:  $xy'' + y' + xy = 0$

(a) Determine the singular points of the given D.E. and classify (prove) each singular point as regular or irregular. 5%

(b) Use the method of Frobenius to obtain the general solution. 15%

3. (1) Consider  $(x^3 - 2x^2 + 3x)^2 y'' + x(x-3)^2 y' - (x+1)y = 0$

- (a) determine the singular points 5%
- (b) classify each singular points as regular or irregular 6%
- (c) without solving the general solution, find the indicial roots about  $x = 0$  6%

4. Use the method of Frobenius to find the general solution of  $x(2-x)y'' - 2(x-1)y' + 2y = 0$  20%