Civil

Marking Scheme and solution

ENGINEERING MATHEMATICS III

COURSE CODE: ES21181CV – U239-111 (T1)

Q 1)

a) Solve the following differential equations

(i)

C.F. $y_c = (c_1 + c_2x)e^{2x}$ 1 mark

P.I. $y_p = -\frac{e^{2x}}{9} sin3x$ 2 marks

Answer:

y= y_c +y_p

$y = (c_1 + c_2x)e^{2x} - \frac{e^{2x}}{9} sin3x$ 1 mark

(ii)

C.F. $y_c = (c_1x^4 + c_2\frac{1}{x})$ 1 mark

P.I. $y_p = \frac{x^5}{6}$ 2 marks

Answer:

y= y_c +y_p

y= $c_1x^4 + c_2\frac{1}{x} + \frac{x^5}{6}$- 1 mark

b) Eliminate y and express differential equation in x 2 marks

find solution for x and put value in any of above eq. to get y 4 marks

Use boundary conditions to eliminate constants 2 marks

Correct answer

$$x = \frac{1}{10}[e^{2x} + e^{-x}] + \frac{1}{20}[cost + 2sint]$$

$$y = -\frac{1}{10}[e^{2x} + e^{-x}] + \frac{2}{5}sint - \frac{1}{20}cost$$

Q2)

a) Correct formulae and values of k_1, k_2, k_3, k_4 3 marks

$$k = \frac{1}{6}[k_1 + 2k_2 + 2k_3 + k_4]$$

y_1= y_0+k 1 mark

Correct formulae and values of k_1, k_2, k_3, k_4 3 marks

$$k = \frac{1}{6}[k_1 + 2k_2 + 2k_3 + k_4]$$

$y_2 = y_1 + k$ 1 mark

b) Table of values of x and y 2 marks

Correct formulae and value of integration by Trapezoidal Rule 3 marks

Correct formulae and value of integration by Simpsons (1/3)rd Rule 3 marks

Q3)

a) First four moments are 0 , 6.15698 , 25.48433 and 378.9418 3 marks

coefficient skewness= 2.78255 & coefficient kurtosis= 9.99625 1 mark

b)

(i) mean of x= 13 and mean value of y =17 2 marks

(ii) coefficient correlation r = 0.6 2 marks