Benha University
Faculty of Engineering – Shoubra
Department of Elec. Eng. and Control
Duration: 2 hours

Final Exam
Course: Mathematics 4
Code: EMP 202
Date : January, 2019

The exam consists of one page No. of questions: 4 Answer **All** questions Total Mark: 40

Question 1 12

Solve the following equations :

(a) $(1+\sin x)dy - y\cos x\,dx = 0$ (b) $y` - \frac{2}{x}y = x^4$

(c) $y`` - 4y` + 4y = 1 + e^x$  (d) $y`` + y = 4 + 3\cos 2x$

(e) $y`` - 2y` + y = x^3 - x$  (f) $y`` + 2y` + 4y = \sin 2x$

Question 2

(a)Find the L.T of : (i) $f(t) = 1 + e^t + \sinh 2t$ (ii) $f(t) = t.\sin t + e^{2t}.\cos t$ 2

(b)By L.T, solve the equation : $y`` - 2y` + y = e^t$, $y(0) = 0$ , $y`(0) = 1$. 4

Question 3

(a) Using the bisection method, find a root to the equation : $3^x + 2x - 2 = 0$ 3

in the interval [0, 1], number of iterations is 3.

(b)Find the integrals : (i) $\int_0^2 \frac{1}{x^4 - x}dx$ (ii) $\int_0^\infty \frac{x^2}{1+x^4}dx$ 4

(c)Find $f`(3)$ where $f(x) = \begin{cases} x^2 + 1, & x > 3 \\ 2^x + 2, & x \le 3 \end{cases}$ and $h = 0.1$ 2

Question 4

(a)Find the curve $y = a + bx + cx^2$ that fits the data : 5

(1, 3), (2, 4), (4, 7), (5, 13), (6, 20)

Also, find $\bar{x}$, $\bar{y}$, σ_x, σ_y and the correlation coefficient r.

(b)Find the probabilities $P(x = 3)$, $P(x \le 5)$, $P(x < 5)$, $P(x > 4)$ from the data: 4

x_i	$x < 2$	2	3	4	5	6	$x > 6$
$f(x_i)$	0	0.2	0.2	0.3	0.2	0.1	0

(c)If x is random variable with pdf $f(x) = 2(1-x)$, $0 \le x \le 1$. 4

Find μ, σ, $P(x = 0.4)$, $P(x \le 0.4)$, $P(x > 0.4)$

Good Luck *Dr. Mohamed Eid*