



Ministry of Higher Education & Scientific Research

University of Technology

Communication Eng. Department

2st Semester - Final Examination (2016/2017)

Subject: mathematics

Division: 1

Year: second

Number of pages: (1)

Date:

Time: 3 hours

Examiner: Ass.Prof.Isra'a Hadi



Note: Answer four questions. (15 marks for each question)

01 JUN 2017

Q1/ a) Find the general solution of the differential equation:

$$y'' - 3y' + 2y = xe^{3x} + 1$$

b) Test the convergence or divergence the series: $\sum_{n=1}^{\infty} \frac{(n+5)!}{5! n! 5^n}$

Q2/ a) Let $I = \iint_R (x - y) dA$, where R is the region in the 1st quadrant bounded by $y = x^3$ and $y = 2 - x$. Sketch the region and find the value of I.

b) Find the parametric equation of the line intersections of the planes $3x - 6y - 2z = 3$ and $2x + y - 2z = 2$.

Q3/ Use Laplace Transform to solve the following differential equations:

$$z'' + y' = \cos t$$

$$y'' - z = \sin t$$

$$z(0) = -1, z'(0) = -1, y(0) = 1, y'(0) = 0.$$

Q4/ a) Find Taylor series at five terms of $f(x) = \frac{1}{x}$, $x=2$, and the interval of converge for the function: $f(x) = \frac{1}{x}$, $x=2$

b) Use the properties of Laplace Transform to find: $\mathcal{L}^{-1} \left\{ \frac{3s-137}{s^2+2s+401} \right\}$.

Q5/ a) Find the curvature of curves $\vec{R}(t) = 2\cos t \mathbf{i} + 3 \sin t \mathbf{j}$ at $t = \frac{\pi}{4}$.

b) Prove that $I = \int_0^{\infty} e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$.

GOOD LUCK