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1. Find the current I_0 in the circuit in Fig. 1. (20%)



Fig. 1

- A load operates at 20 kW, 0.8 pf lagging. The load voltage is 220∠0° V rms at 60 Hz. The impedance of the line is 0.09+j0.3W. Determine the voltage and power factor at the input to the line. (20%)
- 3. The Y-connected impedances shown in Fig.2 are supplied by a three-phase, three-wire ABC system in which $V_{BC} = 208 \angle 0^{\circ} \Omega$. Please calculate the total real power supplied by the source. (20%)



- 4. Find the mesh currents I_1 and I_2 in the coupled circuit shown in Fig. 3 using T-equivalent circuit for the linear transformer. (20%)
- 5. For the circuit shown in Fig. 4, determine the value of Z_L for maximum average power transfer and the value of the maximum average power delivered to the load. (20%)



》國立雲林科技大學 114 學年度 項士班招生考試試題

系所:電機系
科目:工程數學(1)

1. (15%) Solve the general solution of the following differential equations:

А.	$(y^2+3)dx = y\sec^2 xdy$	(5%)
В.	$y' - y = 4e^x$	(5%)
Ċ.	$y' = 10\cos 5x$	(5%)

2. (15%) Solve the following initial value problem with Laplace transform.

$$y'' - 2y' + y = 3t^2$$
, $y(0) = 0$, $y'(0) = 1$

3. (15%) Use the Laplace transform or inverse transform to solve the given problems:

A.
$$f(t) = t^{2} + \cos^{2} t + e^{-2t-5}$$
 $\Re F(s) = \mathcal{L}[f(t)]$ (5%)

B.
$$F(s) = \frac{s}{s^2 + 4}e^2$$
 $\Re f(t) = \mathcal{L}^{-1}[F(s)]$ (5%)

C.
$$f(t) = 2t^2 - e^{-2t} - \int_0^t f(\tau)e^{t-\tau}d\tau \quad \text{for } f(t) \qquad \text{ \mathcal{K}} f(t) = \mathcal{L}^{-1}[F(s)] \qquad (5\%)$$

4. (15%) Solve the following Cauchy-Euler differential equation.

$$x^{2}y'' + 2xy' + y = 3x^{4} \quad (x > 0)$$

5. (10%) Find the augmented matrix and the solution of the following equations.

$$\begin{cases} x+y+z=3\\ 4x+2y+3z=1\\ 2x-y+z=2 \end{cases}$$

6. (10%) Find the eigenvalues and eigenvectors.

$$\mathbf{A} = \begin{bmatrix} 4 & 1 & 1 \\ 0 & 3 & -1 \\ 0 & 0 & 5 \end{bmatrix}$$

7. (10%) Find the Fourier series of f(x) on the interval $-\pi < x < \pi$

$$f(x) = \pi^2 + x^2$$
, $-\pi < x < \pi$

8. (10%) Find the LU-factorization of the given matrix

$$\mathbf{A} = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$$