

Reg. No.

(A constituent unit of MAHE, Manipal)

THIRD SEMESTER B.TECH. (ELECTRONICS & INSTRUMENTATION ENGG.) ONLINE GRADE IMPROVEMENT/MAKE-UP EXAMINATIONS, JULY - 2021

SUBJECT: NETWORK ANALYSIS AND SIGNALS [ICE2154]

19-07-2021

TIME: 2 HOURS

MAX.MARKS: 40

Instructions to candidates: Answer any FOUR FULL questions and missing data may be suitably assumed.

1A. For the circuit shown in Fig. Q(1A), find the current in 1 Ω resistor using superposition theorem.



Fig. Q(1A)

1B. For the circuit shown in Fig. Q(1B), find the value of R_L for maximum power delivery to it. Also calculate the maximum power delivered.



Fig. Q(1B)

(5+5)

2A. In the network shown in Fig. Q(2A), the switch is closed at t=0, a steady state having previously been attained. Determine $V_a(0^{-1})$ and $V_a(0^{+1})$.



Fig. Q(2A)

2B. In the circuit shown in Fig. Q(2B), the switch is opened at t=0, a steady state having previously been attained. Find the complementary function, particular solution and the total solution for i(t). Also specify $V_{C}(\infty)$.



Fig. Q(2B)

3A. Obtain the expression for $i_1(t)$ and $i_2(t)$ in the circuit shown in Fig. Q(3A), with switch closed at t = 0 with zero initial conditions. Use Transform method.



3B. For the network shown in Fig. Q(3B), find Y parameters. Hence find Z parameters.



Fig. Q(3B)

(5+5)

(5+5)

- 4A. (i) Determine whether the signal $x(t)=e^{jt}$ is periodic or not. If periodic, specify the fundamental period.
 - (*ii*) Is the system $y(t) = t^2 x(t)$ is causal, linear, stable and time invariant? Justify.
- 4B (i) Evaluate and plot y(t) = x(t)*h(t), where $x(t) = \delta(t+1)-\delta(t-1)$ and h(t) = r(t+1)-2r(t)+r(t-1)(ii) Find the step response of LTI System with impulse response $h(t) = e^{-|t|}$
- 5A. Find appropriate Fourier representation and sketch magnitude spectrum for the functions given. (i) $x(t) = 1 + \cos(2\pi t) + \sin(3\pi t)$

(ii)
$$x(t) = \sum_{k=-\infty}^{+\infty} (-1)^k \,\delta(t-2k)$$

- 5B.
- (i) Evaluate energy and power of $x(t) = 1 + Cos(\pi t) + Cos(2\pi t) + Sin(5\pi t)$. (ii) Find Fourier transform of

$$x(t) = \frac{1}{2 - jt}$$

(5	+	5)
·		- /

(5+5)

6A. Find x(t) if

$$X(j\omega) = \frac{2\sin(\omega)}{\omega(j\omega+1)}$$

6B. An LTI system is described by the differential equation

$$\frac{d^2 y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = \frac{dx(t)}{dt} + 3x(t)$$

Determine (i) Frequency response of the system (ii) Impulse response of the system (iii) Output of the system for an input of $x(t) = e^{-3t} u(t)$.

(5+5)
