Q6. (a) Determine the i(t) and $v_L(t)$ valid for t>0 in the circuit of Fig.6(a) 5

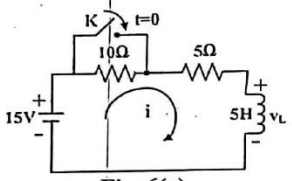

Fig. 6(a)

(b) The complete incidence matrix of a planar graph is given below: 5

Branches→ 1 2 3 4 5 6

Nodes↕

$$\begin{bmatrix} 0 & 1 & 0 & -1 & -1 & 1 \\ 0 & -1 & 1 & 0 & 1 & 0 \\ -1 & 0 & 0 & 1 & 0 & -1 \\ 1 & 0 & -1 & 0 & 0 & 0 \end{bmatrix}$$

Draw the oriented graph. Define branch, node, tree, co-tree, twig and link with examples.

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THIRD SEMESTER **B.Tech. (ECE)**

END SEMESTER EXAMINATION ***February-2019***

EC-207 Engineering Analysis and Design

(Network Analysis & Synthesis)

Time: 3.00 Hour *Max. Marks: 50*

Note: Question number **1** is compulsory. Answer any **four** questions from the rest. Any required data not explicitly given, may be suitably assumed. **Use the answer sheet space judiciously.** Symbols have their usual meanings.

Q1. Choose the correct or best alternative in the following: **10**

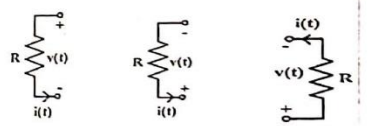
(i) In order that f(t) be Laplace transformable, it is sufficient that:

(a) $\int_{0_-}^{\infty} |f(t)|e^{-\sigma t}dt > \infty$ (b) $\int_{0_-}^{\infty} |f(t)|e^{\sigma t}dt < \infty$ (c) $\int_{0_-}^{\infty} |f(t)|e^{-\sigma t}dt < \infty$

(d) some other answer

(ii) The derivative of the unit ramp function is the:
(a)unit step (b) unit impulse (c) doublet (d) some other answer

(iii) Which of the circuits shown in Fig. 1(iii) are characterized by the equation v(t) = Ri(t):
(a) circuit 1 (b) circuit 2 (c) circuit 3 (d) some other answer



circuit 1 circuit 2 circuit 3

Fig.1(iii)

(iv) The poles and zeros of a positive real function :
(a) Must be in right half of the s plane
(b) Must be in left half of the s plane
(c) Can be anywhere in the s plane
(d) None of the above

(v) The number of twigs, in any selected tree of a graph with 'b' branches and 'n' nodes is:
(a) (n-1) (b) (b-n+1) (c) n (d) (b –n)

(vi) A two-port network is symmetrical if:
(a)$z_{11}z_{22} - z_{12}z_{21} = 1$ (b) $h_{11}h_{22} - h_{12}h_{21} = 1$ (c) $g_{11}z_{22} - g_{12}z_{21} = 1$

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(d) AD– BC =1

(vii) The input immittance of an LC network must have:
(a) a zero at infinity (b) a pole at infinity (c) either a pole or a zero at infinity (d) neither a pole nor a zero at infinity

(viii) $\mathrm{Re}[Z_{RC}(j\omega)]$ is a:

(a)monotonically increasing function of ω (b) monotonically decreasing function of ω (c) positive real constant (d) maximum at a non-zero finite frequency

(ix) The value of current i in the circuit of Fig.1(ix):

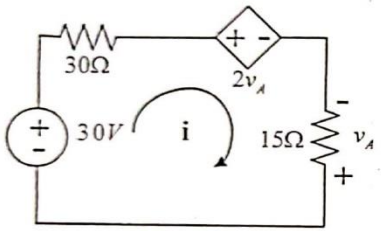

Fig.1(ix)

(a) $1A$ (b) $3A$ (c) $2A$ (d) $0.5A$

(x) Suppose $V_c(t) = \sin(40t + \frac{\pi}{6})V$. The value of $i_C(t)$ in Fig. 1(x) is:

(a) $10\cos(40t + \frac{\pi}{6})A$ (b) $40\cos(20t + \frac{\pi}{6})A$ (c) $10\sin(20t + \frac{\pi}{6})A$

(d) $20\sin(40t + \frac{\pi}{6})A$

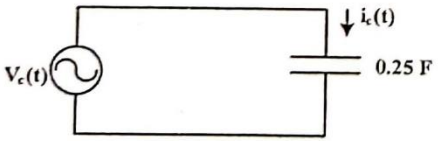

Fig.1(x)

Q2. (a) Derive the inter-relationship between z parameters and h parameters. **5**

(b) Calculate the maximum power that can be delivered to the Load (R_L) for the circuit given in Fig.2(b). **5**

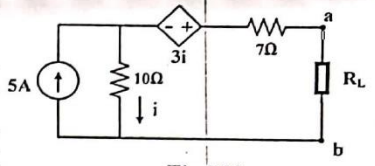

Fig.2(b)

Q3. Find the expression for $v_C(t)$ and $v_L(t)$ in the circuit of Fig.3,valid for all time t. **10**

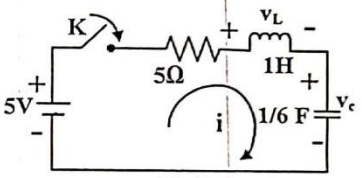

Fig.3

Q4. Which of the following functions is LC driving point impedance? **10**

$$Z_1(s) = \frac{s(s^2+4)(s^2+16)}{(s^2+9)(s^2+25)}$$

$$Z_2(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)}$$

$$Z_3(s) = \frac{s(s+3)}{(s+1)(s+5)}$$

Give justification and synthesize the realizable impedance in second Foster form (parallel) and first Cauer form.

Q5. Which of the following functions is RC driving point impedance? **10**

$$Z_1(s) = \frac{(s+1)(s+3)}{s(s+2)}$$

$$Z_2(s) = \frac{2(s+1)(s+6)}{(s+2)(s+3)}$$

$$Z_3(s) = \frac{(s^2+1)(s^2+16)}{s(s^2+9)}$$

Give justification and synthesize the realizable impedance in one of the Foster form and one of the Cauer form