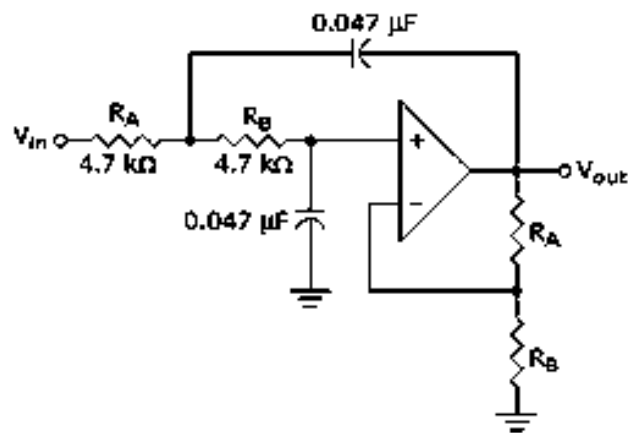


(ix) Refer to the given figure. This circuit is known as a _____ filter, and the f_c is _____.



- (a) high-pass, 1.59 kHz
 (b) high-pass, 15.9 kHz
 (c) low-pass, 15.9 kHz
 (d) band-pass, 15.9 kHz

(x) As the damping factor of a filter circuit reduces, the overshoot of the response around the cut-off frequency
 (a) Reduces (b) Increases (c) Remains same (d) none of these.

Fill in the blanks with the correct word

- (xi) In a dc network the efficiency under maximum power transfer condition is _____.
 (xii) Integration of a unit step function will lead to _____ function .
 (xiii) The relation between branch current matrix and loop current matrix is _____.
 (xiv) Which variable is independent in Y parameters calculation _____.
 (xv) The cut-off rate in a 3rd order filter is _____.

Group - B

2. (a) For the circuit shown in Fig.1, use mesh analysis to calculate the mesh currents.

[[CO1)(Analyse/HOCQ]]

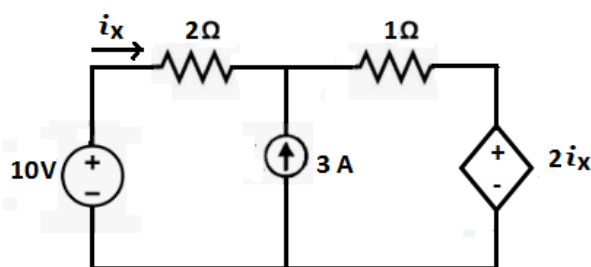


Fig.1

(b) Calculate current through 5Ω resistance of the circuit shown in Fig. 2 using Norton's theorem.

[[CO1)(Apply/IOCQ]]

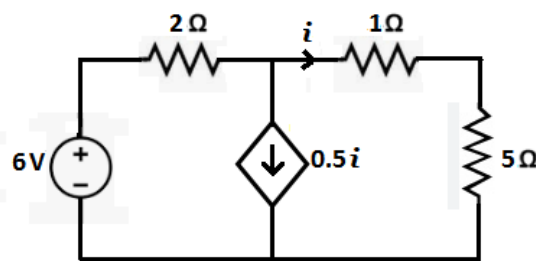


Fig. 2

6 + 6 = 12

3. (a) Derive the condition for maximum power transfer from source to load of the circuit shown in Fig.3 where $Z =$ source impedance and Z_L is the load impedance.

[[CO1)(Analyse/HOCQ]]

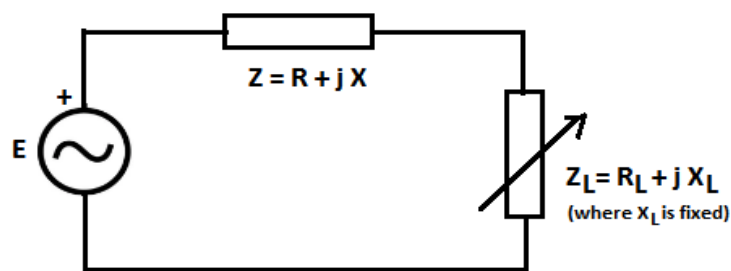


Fig. 3

(b) Use superposition theorem to find i_0 for the circuit shown in Fig. 4.

[[CO1)(Apply/IOCQ]]

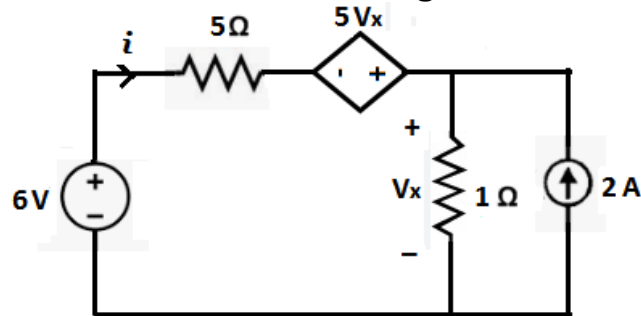


Fig.4

- (c) Draw the conductively coupled circuit of the given magnetically coupled circuit shown in the Fig. 5. [[CO2](Apply/IOCQ)]

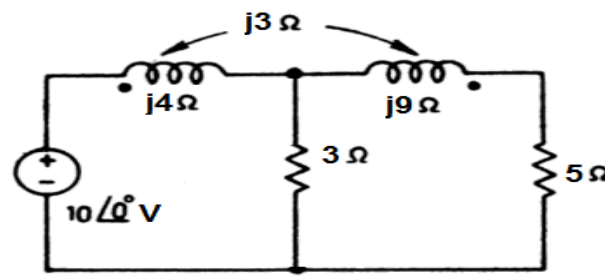


Fig.5

3 + 6 + 3 = 12

Group - C

4. (a) Determine Laplace transform for the waveform shown in Fig. 6. [[CO3](Analyse/HOCQ)]

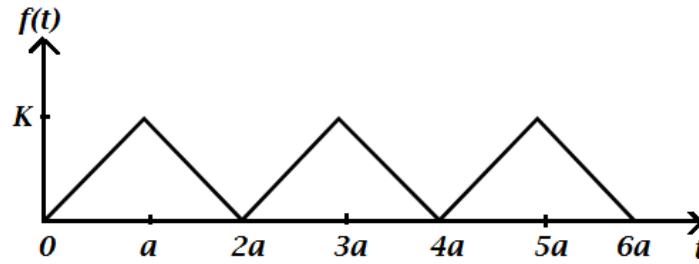


Fig. 6

- (b) In the network shown in the Fig. 7, the switch 'K' is closed and a steady state is reached in the network. At time $t = 0$, the switch is opened. Determine the expression for current through the inductor, $i(t)$ for $t > 0$. [[CO3](Apply/IOCQ)]

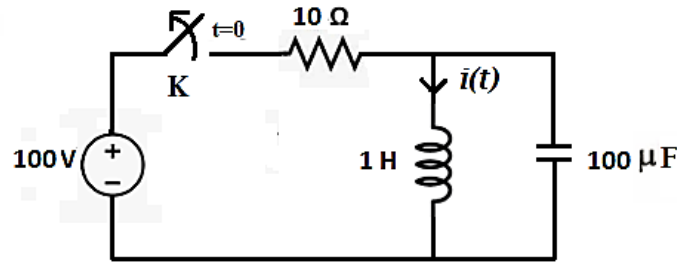


Fig. 7

6 + 6 = 12

5. (a) A rectangular pulse $x(t)$ as shown in Fig. 8(a), determine its Laplace transform $X(s)$. Also show that the inverse Laplace transform of $X^2(s)$ gives the triangular waveform $y(t)$ as shown in Fig. 8(b). [[CO3](Analyse/HOCQ)]

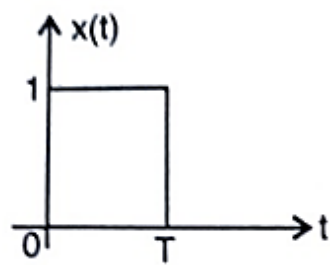


Fig. 8(a)

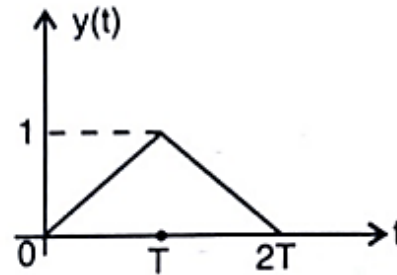


Fig. 8(b)

- (b) In the R-L circuit shown in the Fig. 9, the switch is in position 1 for long time. At $t = 0$, the switch is moved to position 2. Determine the expression of current for $t > 0$. [[CO3](Apply/IOCQ)]

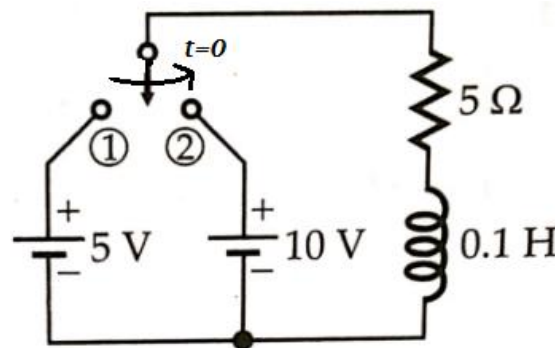


Fig. 9

- (c) Define unit step signal. Draw its waveform. [[CO3](Understand/LOCQ)]

4 + 6 + 2 = 12

Group - D

6. (a) Develop complete incidence matrix of the directed graph shown in the Fig. 10. [[CO4](Create/HOCQ)]
 (b) Assume the sub-graph shown in the Fig. 11 as a tree and develop fundamental Cut-set matrix and Tie-set matrix. [[CO4](Apply/IOCQ)]

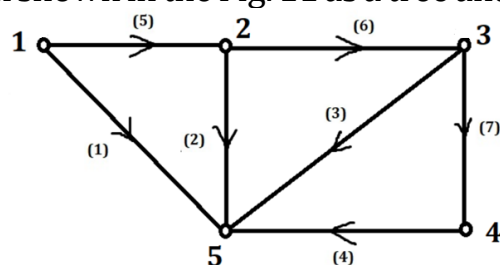


Fig. 10

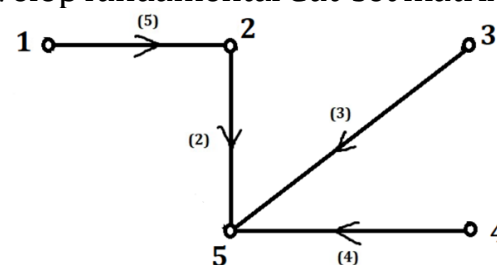


Fig. 11

4 + (4 + 4) = 12

7. (a) Analyse the circuit shown in the Fig. 12 and find ABCD parameters.

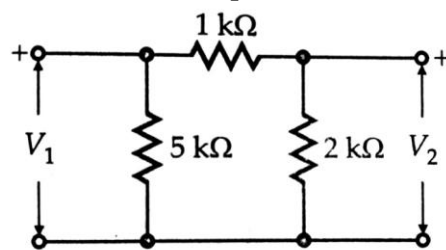


Fig. 12

- (b) For hybrid parameters, develop the condition of reciprocity.
 (c) Define Y-parameters. Express Z-parameters in terms of hybrid parameters.

[[CO5](Analyse/IOCQ)]

[[CO5](Create/HOCQ)]

[[CO5](Remember/LOCQ)]

6 + 3 + (1 + 2) = 12

Group - E

8. (a) Sketch the circuit diagram of a 2nd order active low pass Sallen - Key filter.
 (b) Design a Notch Filter with a centre frequency of 60 Hz.
 (c) Sketch the Gain vs Frequency plot of Notch Filter.
 (d) Design a 2nd order Sallen-Key Filter whose cut-off frequency is 2 kHz with Quality Factor = 1.
 (e) What is the nature of poles for different damping conditions?

[[CO6](Apply/HOCQ)]

[[CO6](Create/HOCQ)]

[[CO6](Apply/IOCQ)]

[[CO6](Create/HOCQ)]

[[CO6](Remember/LOCQ)]

2 + 3 + 2 + 3 + 2 = 12

9. (a) Design a second order Butterworth low pass Filter with cut-off frequency 2 kHz.
 (b) Sketch the circuit diagram of Wide Band Reject Filter.
 (c) Write the normalised transfer function of a Butterworth Filter.
 (d) Define cut-off frequency of a filter.
 (e) Determine the centre frequency of Band Pass Filter whose lower and higher cut-off frequencies are 10 kHz and 40 kHz, respectively.

[[CO6](Create/HOCQ)]

[[CO6](Apply/IOCQ)]

[[CO6](Remember/LOCQ)]

[[CO6](Remember/LOCQ)]

[[CO6](Evaluate/HOCQ)]

4 + 3 + 1 + 2 + 2 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	10	48	42