

**B. TECH. SEM – III (BIOMEDICAL ENGG.) (2014 COURSE)**

**(CBCS) : SUMMER - 2018**

**SUBJECT: CIRCUIT THEORY**

**Day: Thursday**  
**Date: 24/05/2018**

**S-2018-2265**

**Time: 02.30 PM TO 05.30 PM**  
**Max. Marks: 60**

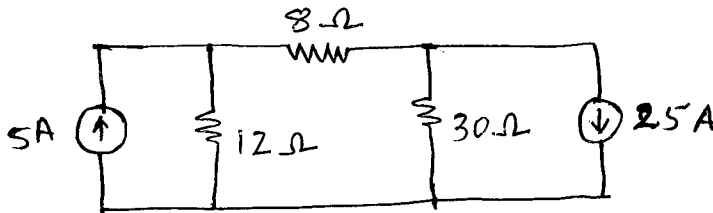
**N.B:**

- 1) All questions are **COMUPLSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Draw neat and labeled diagram **WHEREVER** necessary.

**Q.1** State and prove the following theorems. **(10)**  
i) Thevenin's theorem      ii) Maximum power transfer theorem.

**OR**

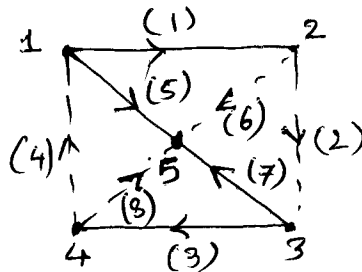
**Q.1** Find the current through the  $8\Omega$  resistor using superposition theorem in **(10)** following figure.



**Q.2** Define following terms with example. **(10)**  
i) Non-planar graph      ii) Rank of Graph  
iii) Tree      iv) Co-tree      v) Path

**OR**

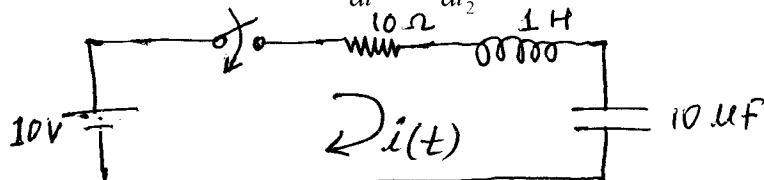
**Q.2** For the graph shown in following figure write the incidence matrix, tieset matrix and f- cutset matrix. **(10)**



**Q.3** Derive the expressions of current and voltages for driven and undriven RL **(10)** circuits.

**OR**

**Q.3** In the network shown in the following figure, the switch is closed. Assuming **(10)** all initial conditions as zero, find  $i$ ,  $\frac{di}{dt}$  and  $\frac{d^2i}{dt^2}$  at  $t=0^+$



**Q.4 a)** Justify a parallel resonant circuit as current amplifier. **(05)**

**b)** Derive expression for cut off frequency for parallel resonant circuit. **(05)**

**P.T.O.**

**OR**

**Q.4** A  $50 \mu F$  capacitor, when connected in series with a coil having  $40 \Omega$  resistance, resonates at 1 KHz. Find the inductance of the coil. Also obtain the circuit current if the applied voltage is 100v. Also calculate the voltage across the capacitor and the coil at resonance. **(10)**

**Q.5 a)** Describe the Composite filter. **(05)**

**b)** Derive the expression for cut off frequency of constant K-Low pass filter. **(05)**

**OR**

**Q.5** Design a T-section constant K-high pass filter having cut off frequency of 10KHz and design impedance  $R_o = 600 \Omega$ . Find its characteristic impedance and phase constant at 25KHz. **(10)**

**Q.6** Discuss the following: **(10)**

- i) Cascade connection of two port networks.
- ii) Series parallel connection of two port networks.

**OR**

**Q.6** Derive reciprocity and symmetry conditions in terms of : **(10)**

- i) Z- parameters
- ii) Hybrid parameters

\* \* \* \* \*