

**B. TECH. SEM – III (BIOMEDICAL ENGG.) (2014 COURSE) (CBCS)
: WINTER - 2017
SUBJECT: CIRCUIT THEORY**

Day: Friday
Date: 19/01/2018

Time: 10.00 AM TO 01.00 PM
Max. Marks: 60

W-2017-2057

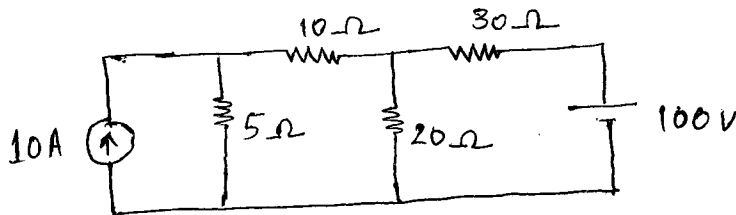
N.B:

- 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 Derive the equations for converting T network to π network. **(10)**

OR

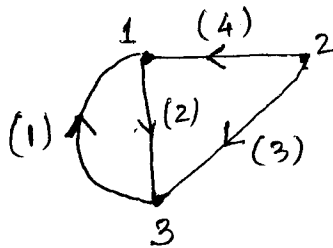
Q.1 Find the current through the $10\ \Omega$ resistor in the following figure using **(10)** superposition theorem.



Q.2 Define the following terms with example. **(10)**
i) Planar Graph ii) Sub-graph iii) Path iv) Loop v) Tree

OR

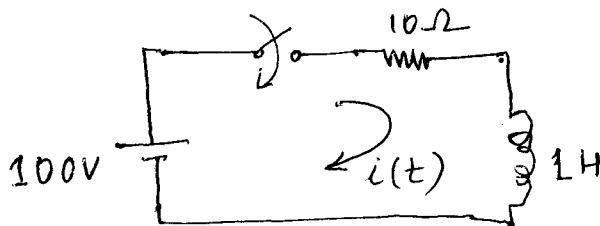
Q.2 For given graph write: i) incidence matrix ii) tieset matrix iii) cutset matrix **(10)**



Q.3 Derive the expressions of voltage and current for driven and undriven RC **(10)** circuit.

OR

Q.3 In the given network of following figure, the switch is closed at $t=0$. With zero **(10)** current in the inductor, find i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t=0^+$.



P.T.O.

Q.4 A series LCR circuit has inductance of 1mH and 2Ω resistance. Find the value of capacitance that will produce resonance. Also find the current at resonance frequency and the maximum instantaneous energy stored in the inductance at resonance. Take the supply as 230V,5000Hz. **(10)**

OR

Q.4 a) Define quality factor 'Q'. Derive the expressions for Q factor of an inductor and Q factor of a capacitor. **(07)**

b) Derive expression for cut off frequency for series resonant circuit. **(03)**

Q.5 a) Compare m-derived filter and prototype filter. **(05)**

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

OR

Q.5 A T-section of a low pass filter has series inductance of 100 mH and shunt capacitance of $0.025\mu F$. Find the cut-off frequency and nominal design impedance. Also design an equivalent π section. Find its characteristic impedance and phase constant at 24KHz. **(10)**

Q.6 Write down the equations for Z- parameters in terms of:
i) Y- parameters ii) h -parameters iii) ABCD parameters **(10)**

OR

Q.6 Discuss the following: **(10)**
i) Series connection of two port network.
ii) Parallel connection of two port network.