BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER: I/BL**
BRANCH: CIVIL/CHEM. ENGG./CHEM. & POLY./BIOTECH/MECH/PROD/ **SESSION : MO/2019**

SUBJECT : EE101 BASIC ELECTRICAL ENGG.

TIME: 2.00 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

Q1 (a) State KVL and KCL and also give one example for each. [2]

Q1 (b) with the current as marked in Fig. 1, (i) write KCL at the four nodes; (ii) write KVL in meshes ABDA, BCDB and ADCMA. [3]

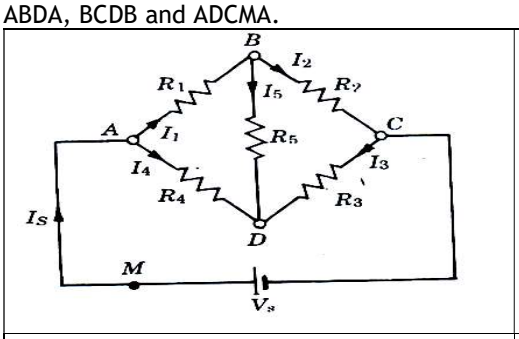

Fig. 1

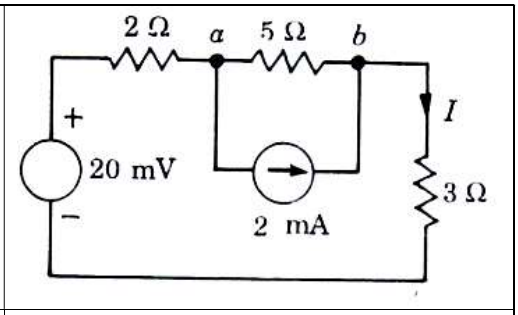

Fig. 2

Q2 (a) Use source transformation to find current ***I*** in Fig. 2. [2]

Q2 (b) Using mesh current methord, determine current I_x in Fig.3. [3]

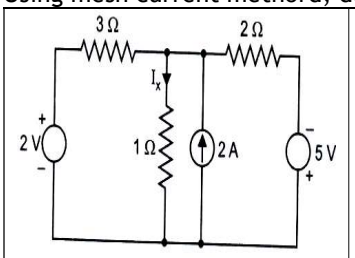

Fig. 3

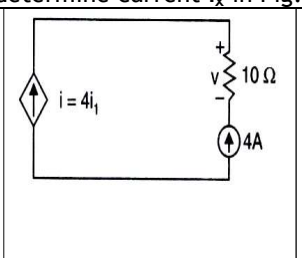

Fig. 4

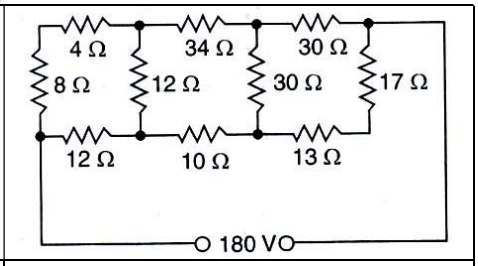

Fig. 5

Q3 (a) Find the voltage ***v*** across the 10 Ω resistor in Fig. 4, if the control current I_1 in the dependent current source is (i) 2A and (ii) -1A. [2]

Q3 (b) Find the current in 10 Ω resistor in Fig. 5 by star-delta transformation. Draw each conversion network. [3]

Q4 (a) Draw circuit diagram, phasor diagram and impedance triangle of (i) series RL circuit and (ii) parallel RC circuit. [2]

Q4 (b) A series circuit of a 300 Ω non-inductive resistor, a 7.95 μF capacitor and a 2.06 H inductor of negligible resistance. If the supply voltage is 250 V at 50 Hz, calculate: (i) the circuit current; (ii) the phase angle and (iii) the voltage drop across each element. [3]

Q5 (a) Draw variation of R, X, XL, XC and –XC with frequency for a series resonance circuit. [2]

Q5 (b) A 10 mH coil is connected in series with a loss-free capacitor to a variable frequency source which supplies a constant voltage of 10 V. The circuit current has a maximum values of 0.1 A at a frequency of 80 kHz. Calculate (i) the capacitance of the capacitor, (ii) the Q factor of the coil, and (iii) the half power frequency. [3]

:::::: 16/10/2019 M ::::::