

Dec 2018

B.Tech. I SEMESTER

ELECTRICAL TECHNOLOGY (BEC/E-105)

Time: 3 Hours

Max. Marks:60

- Instructions:**
1. It is compulsory to answer all the questions (2 marks each) of Part -A in short.
  2. Answer any four questions from Part -B in detail.
  3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART -A**

- 1) Differentiate unilateral and bilateral circuits. (2)
- 2) What is the significance of 'j' operator. (2)
- 3) A 60-Hz voltage of 230-V effective value is impressed on an inductance of 0.265 H. Write the time equation for the voltage and the resulting current. (2)
- 4) Define the terms related to magnetic circuits : (i) reluctance (ii) flux density (iii) magnetomotive force (2)
- 5) State Millman's theorem. (2)
- 6) What are the effects of low power factor? (2)
- 7) Define statically and dynamically induced emfs. (2)
- 8) What are the advantages of three phase system over single phase system? (2)
- 9) What is the function of Commutator in a d.c. machine? (2)
- 10) Why transformer cores are laminated? (2)

**PART -B**

- Q2 (a) Find the current in the branches of the network shown in figure-1 using nodal voltage method. (5)

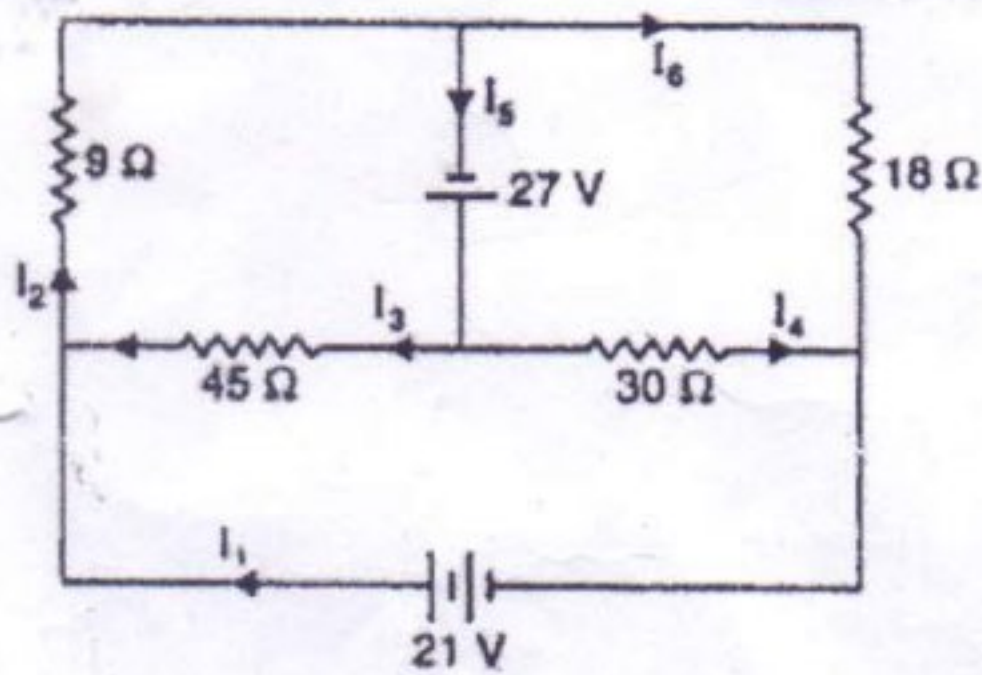


Figure-1

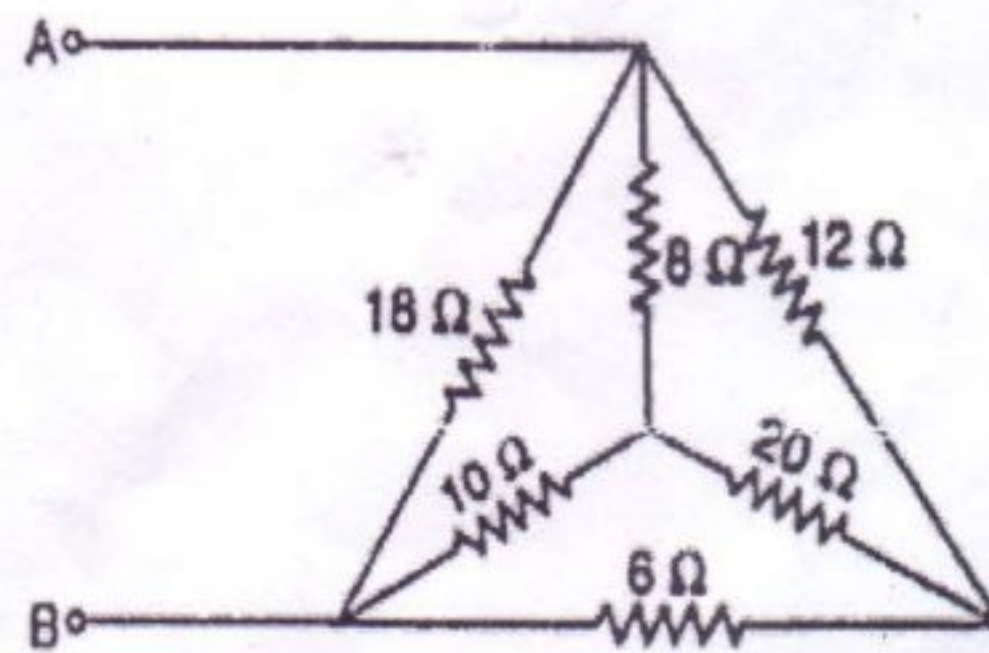


Figure-2

- 2) Figure-2 shows a number of resistances connected in star and delta. Find the resistance across the terminals A and B. Use star/delta conversion method. (5)
- Q3 (a) Find the average value, effective value, form factor and peak factor for the wave shape shown in figure-3 if the curves are parts of a sine wave. (5)

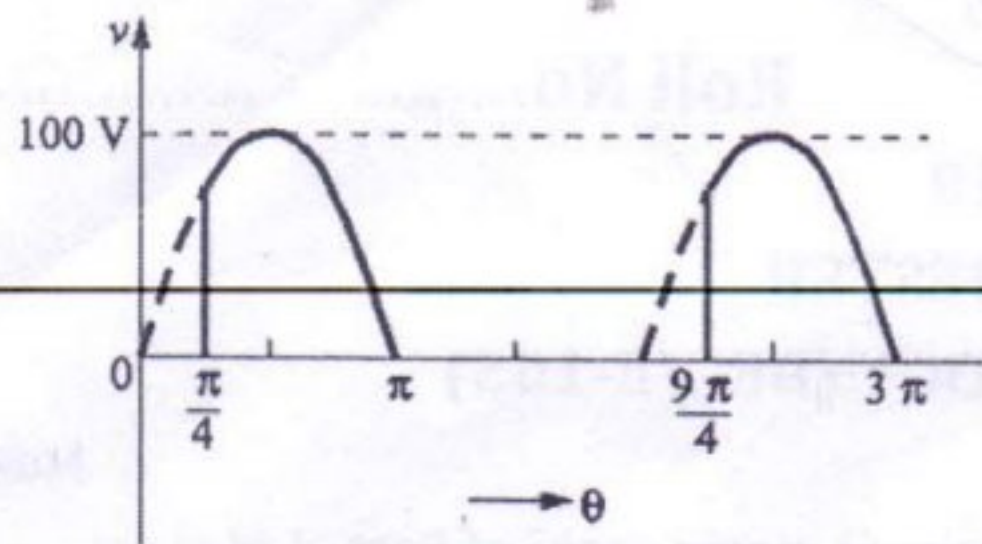


Figure-3

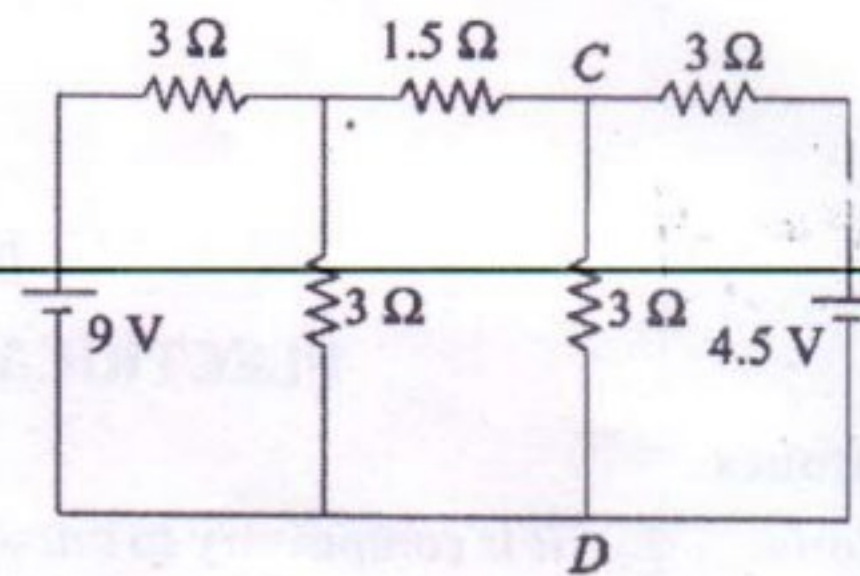


Figure-4

- (b) State and explain maximum power transfer theorem. (5)
- Q4 (a) Find the current through the  $3\Omega$  resistance connected between C and D in the (5)  
circuit shown in figure-4 using superposition theorem.
- (b) Compare electric and magnetic circuits with respect to their similarities and (5)  
dissimilarities.
- Q5 (a) Two circuits, the impedances of which are given by  $Z_1 = 15 + j12$  ohms and (5)  
 $Z_2 = 8 - j5$  ohms are connected in parallel. If the potential difference across one of  
the impedance is  $250 + j0$  V, calculate: (i) total current and branch currents (ii)  
total power and power consumed in each branch and (iii) overall power-factor  
and power-factor of each branch.
- (b) What is meant by resonance in series a.c. circuit? Draw resonance curve. Define (5)  
half power frequencies and quality factor for series resonant circuit.
- Q6 (a) Three identical coils are connected in star to a 400V, three phase, a.c. supply and (5)  
each coil takes 300W. If the power factor is 0.8 lagging, calculate: (i) the line  
current (ii) impedance and (iii) resistance and inductance of each coil.
- (b) Explain two wattmeter method of power measurement in three phase system at (5)  
balance load. What are the effects of power factor on wattmeters reading?
- Q7 (a) Explain the construction and working of three phase induction motor with neat (5)  
sketches.
- (b) Explain working principle of transformer. Also, derive emf equation of single phase (5)  
transformer.

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