Time 3 Hours

Max. Marks: 60

Note: Attempt any two parts from each question.

Q.1 a) Explain behaviour of a series RLC circuit when connected across A.C. input. **6**
Also explain series RLC resonance.

b) Show that the sum of energy stored by the inductor and the capacitor in a **6**
parallel RLC circuit at any instant is constant at resonant frequency and is equal
to CV^2.

c) A coil having a resistance of 50Ω and inductances 10mH is connected in series **6**
with a capacitor and is supplied at constant voltage and variable frequency
source. The maximum current is 1A at 750Hz. Determine the bandwidth and
half power frequencies.

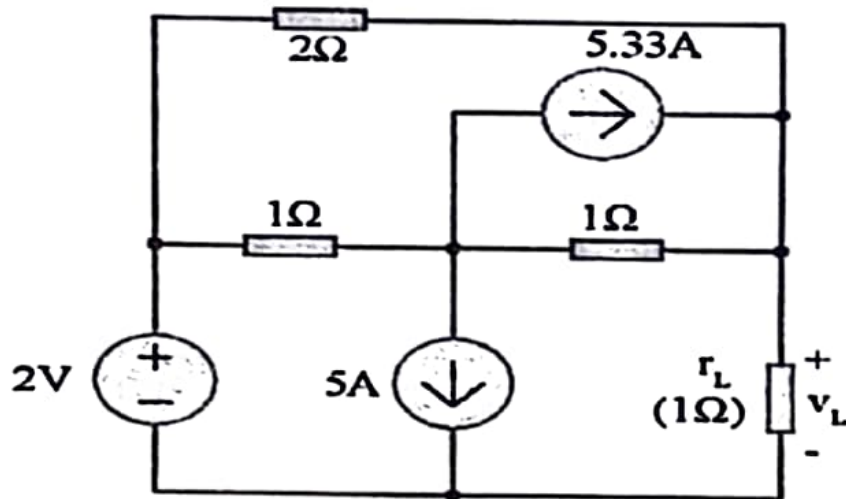Q.2 a) If $Va - V_b = 6V$ then $Vc - Vd =$ **6**
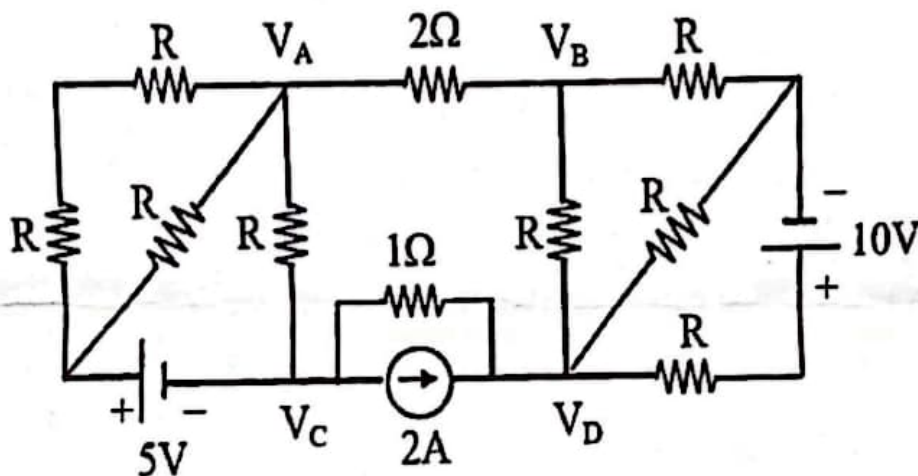
b What is the maximum power transfer to the load R and the value of R for which **6**
maximum power is transferred.
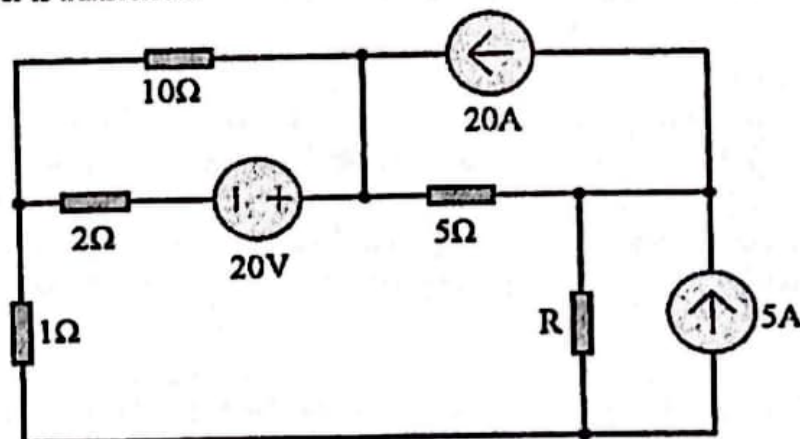
c) Find the value of V_L as shown in figure below using superposition theorem.   6

Q.3 a) Write short note on autotransformer along with its derivation for saving of copper.   6

b) A single phase transformer 250/500V gave the following test results: 6
O.C. test – 250V, 1A, 80W (L.V. side)
S.C. test – 20V, 12A, 100W (H.V. side)
Calculate the circuit constants and show them on an equivalent circuit.

c) A series magnetic circuit comprises of 3 sections (1) length of 80mm with cross sectional   6
area of 60mm^2, (2) length of 70mm with cross sectional area 80mm^2 and (3) air gap of
length 0.5mm with cross sectional area of 60 mm^2. Sections (1) and (2) having magnetic
characteristics given by following table.

H (AT/m)	100	210	340	500	800	1500
B(Tesla)	0.2	0.4	0.6	0.8	1.0	1.2

Determine current necessary in a coil of 4000 turns wound on section (2) to produce a flux
density of 0.7 tesla in the air gap. Neglect magnetic leakage.

Q.4 a) Write short note on different types of characteristics of DC motors.   6
b) How Commutation and armature reaction affects performance of a DC machine   6
c) Derive EMF equation of a DC machine. A four-pole generator with wave wound   3+3
armature has 51 slots, each having 24 conductors per slot. The flux per pole is 0.01 wb.
At what speed must the armature rotate to give an induced emf of 250V? what will be
the voltage developed, if the winding is lap connected and the armature rotates at the
same speed.

Q.5 a) Why Three Phase Synchronous motors are not self-started. Enlist all starting methods   3+3
and explain any one in detail.
b) Compare and contrast Squirrel cage and Phase wound rotors along with their application   6
areas.
c) "Single phase induction motors are inherently not self started " Justify your answer   6
along with its starting methods in detail.

ALL THE BEST