PAPER ID-411443

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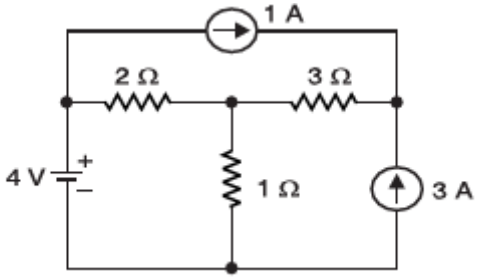
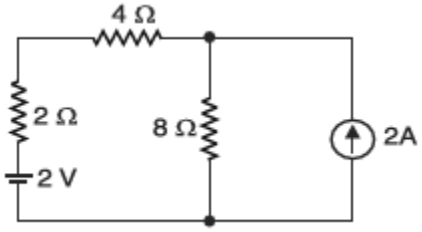
BTECH
(SEM I) THEORY EXAMINATION 2021-22
BASIC ELECTRICAL ENGINEERING

Time: 3 Hours ***Total Marks: 100***

Notes:

- *Attempt all Sections and Assume any missing data.*
- *Appropriate marks are allotted to each question, answer accordingly.*

SECTION-A	Attempt **All** of the following Questions in brief	Marks **(10X2=20)**
Q1(a)	What is use of form factor and peak factor?	
Q1(b)	What is the ratio of no-load speed to full load speed of a 200 kVA, 12 poles, 2200 V, 3 phase, 60 Hz synchronous motor?	
Q1(c)	Write Difference between EMF and Potential Difference	
Q1(d)	Define power factor	
Q1(e)	Is the superposition theorem valid for direct calculation of power? Explain briefly.	
Q1(f)	What is the need of commutator in DC generator?	
Q1(g)	Why is Transformer Ratings done in Volt Amperes (VA).	
Q1(h)	Draw the no load phasor diagram of a transformer	
Q1(i)	For heavy loads,What is the relation between torque (T) and slip (S) in induction motor.	
Q1(j)	What is the difference between asynchronous motor and synchronous motor?	

SECTION-B	Attempt **ANY THREE** of the following Questions	Marks **(3X10=30)**
Q2(a)	(i) Derive the emf equation of a transformer (ii) Derive the condition for maximum efficiency in single phase transformer	
Q2(b)	i) List all the important parts of a D.C. Motor and explain the importance of each.. ii) Calculate the emf generated by 4 pole wave wound generator having 65 slots with 12 conductors per slot when driven at 1200 rpm. The flux per pole is 0.02 wb.	
Q2(c)	Using Thevenin theorem, find current in 1 Ω resistor in the circuit shown in figure below: 	
Q2(d)	Use nodal analysis to find the voltage across and current through 4 Ω resistor in Figure given below: 	
Q2(e)	Use superposition theorem to find current I in the circuit shown in Figure below. All resistance are in ohms.	

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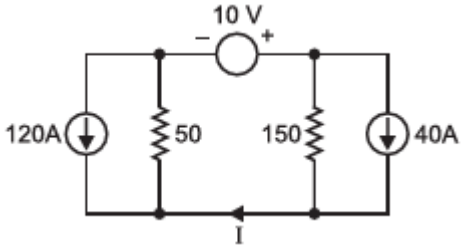
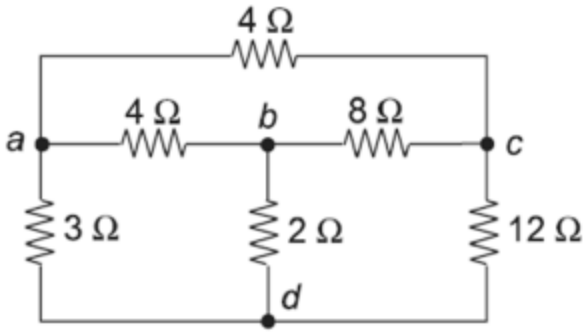
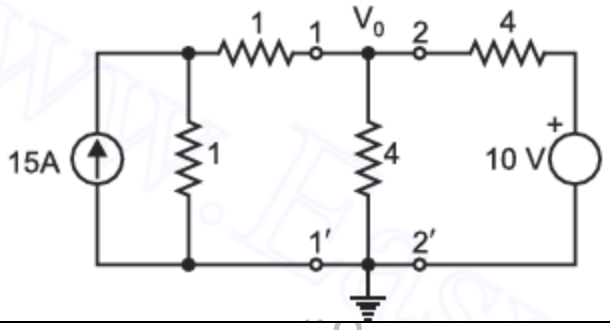


SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**

Q3(a) Reduce the network of Fig. 1 to obtain the equivalent resistance as seen between nodes ad.



Q3(b) With the help of Norton's theorem, find V_0 in the circuit shown below. All resistances are in Ohms.



SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**

Q4(a) A series R – L – C circuit consists of R = 1000 Ohm, L = 100 mH and C = 10 μF.
The applied voltage across the circuit is 100 V.
(i) Find the resonant frequency of the circuit.
(ii) Find the quality factor of the circuit at the resonant frequency.
(iii) At what angular frequencies do the half power points occur?
(iv) Calculate the bandwidth of the circuit.

Q4(b) Three impedances of (70.7 + j 70.7) Ohm, (120 + j 160) Ohm and (120 + j 90) Ohm are connected in parallel across a 250 V supply. Determine (i) admittance of the circuit (ii) supply current and (iii) circuit power factor.

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**

Q5(a) A transformer on no-load has a core loss of 50W, draws a current of 2A and has an induced emf of 230V. Determine the no-load power factor, core loss current and magnetizing current. Also, calculate the no-load circuit parameters of the transformer. Neglect winding resistance and leakage flux.

Q5(b) Explain the performance of principal of operation of single phase transformer.

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SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**
Q6(a)	A 4-pole generator with 400 armature conductors has a useful flux of 0.04Wb per pole. What is the emf produced if the machine is wave wound and runs at 1200rpm? What must be the speed at which the machine should be driven to generate the same emf if machine is lap wound?	
Q6(b)	An 8-pole, 400V shunt motor has 960 wave connected armature conductors. The full load armature current is 40A and flux per pole is 0.02Wb. The armature resistance is 0.1Ω and the contact drop is 1V per brush. Calculate the full load speed of the motor.	

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**
Q7(a)	(i) Explain the slip torque characteristics of the three-phase induction motor (ii) The voltage applied to the stator of a three phase, 4 pole induction motor has frequency of 50 Hz. Th frequency of the emf induced in the rotor is 15.5 Hz. Determine the slip and speed at which motor is running.	
Q7(b)	(i) Write short notes on MCB and MCCB (ii) Write short notes on characteristics of batteries.	