PAPER ID-421110

Roll No: | | | | | | | | | | | | | |

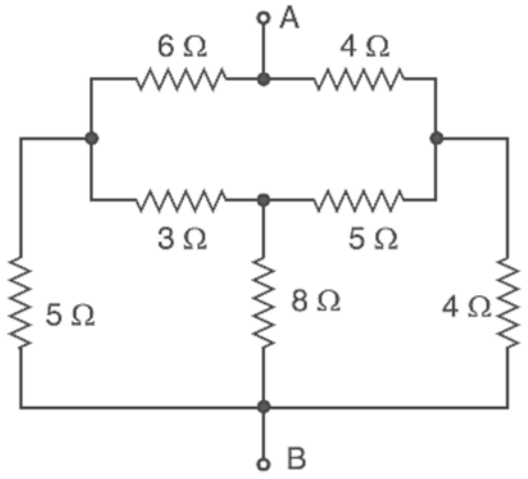
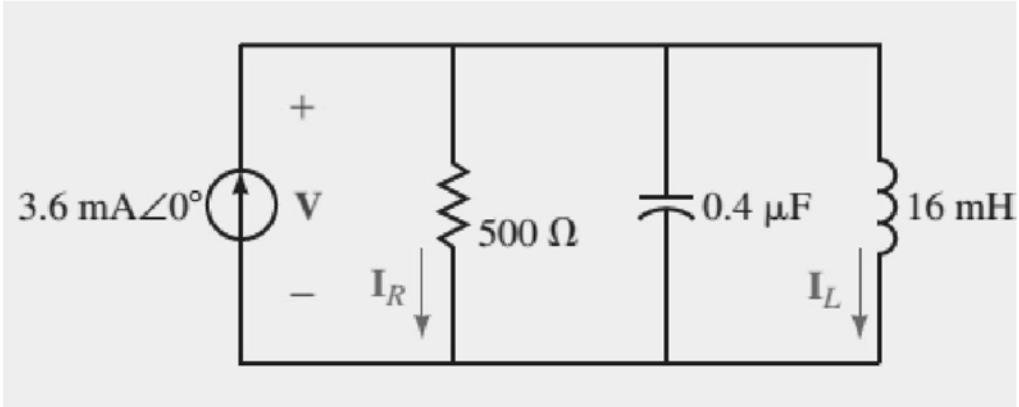
BTECH
(SEM II) THEORY EXAMINATION 2021-22
BASIC ELECTRICAL ENGINEERING

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 **(10*2=20)**	**CO**
Q1(a)	Draw the V-I characteristics for ideal voltage source and ideal current source.		1
Q1(b)	Why is linearity important in circuits?		1
Q1(c)	Why do we represent A.C. by sinusoidal waveform?		2
Q1(d)	Why the average power consumed in purely inductive circuit is zero?		2
Q1(e)	What is the nature of load for negative voltage regulation in the transformer?		3
Q1(f)	Draw the phasor diagram for an ideal transformer on no load.		3
Q1(g)	What is the generated EMF in D.C. generator?		4
Q1(h)	Why synchronous motor is doubly excited?		4
Q1(i)	What are the common problems that occur during electrical installations?		5
Q1(j)	Write any two battery characteristics. Also, define any one.		5

SECTION-B	Attempt **ANY THREE** of the following Questions	Marks**(3*10=30)**	**CO**
Q2(a)	Calculate equivalent resistance across terminals A and B using star-delta or delta-star conversion for the given figure below. 		1
Q2(b)	Consider the circuit shown in figure below and calculate the following@#  a. Determine the resonant frequencies, ω(rad/s) and f(Hz) of the tank circuit. b. Find the Q of the circuit at resonance. c. Calculate the voltage across the circuit at resonance. d. Solve for currents through the inductor and the resistor at resonance.		2

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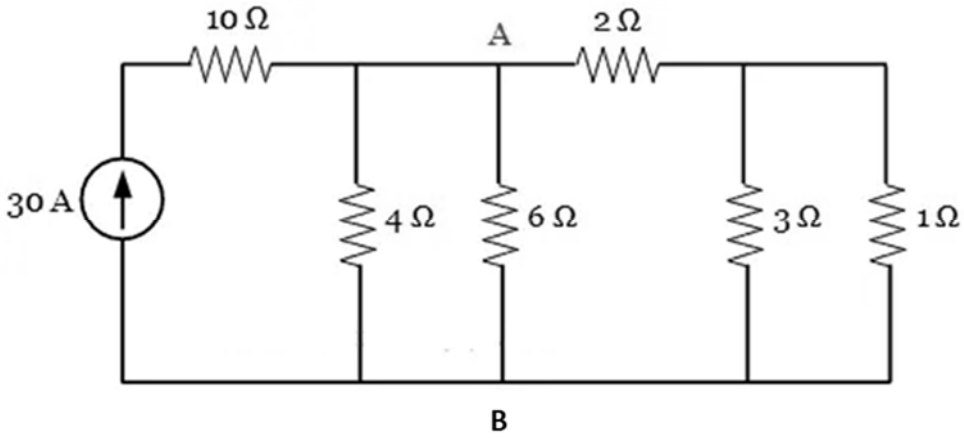
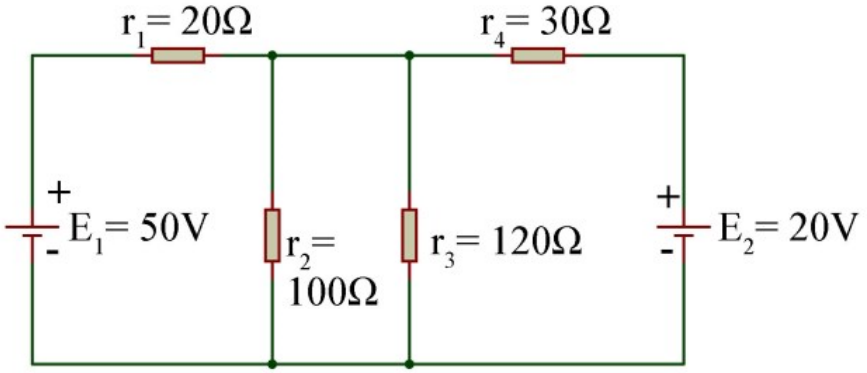
Q2(c)	State the significance of the regulation of transformer. A 4kVA, 200/400 V, 50 Hz, single phase transformer has equivalent resistance referred to primary as 0.15 Ω. Calculate, (i) The total copper losses on full load (ii) The efficiency while supplying full load at 0.9 power factor lagging (iii) The efficiency while supplying half load at 0.8 power factor leading. Assume total iron losses equal to 60 W.	3
Q2(d)	What are the factors affecting speed of a DC motor? Compare lap and wave type armature winding.	4
Q2(e)	Draw and explain the characteristics of a battery. Calculate the backup of a battery of 150AH connected to load of 150 watts, and the supply voltage is 12V.	5

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1*10=10)**	**CO**
Q3(a)	. Determine the current through **A-B** in the given circuit using Norton's theorem. 		1
Q3(b)	Using the Nodal method, find the current through resistor r_2 in the given figure below. 		1

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1*10=10)**	**CO**
Q4(a)	Derive mathematically dynamic impedance (Z_D) offered by RLC parallel circuit under resonance. Also, draw its phasor diagram.		2
Q4(b)	Two coils having resistance 5 Ω and 10 Ω and inductances 0.04 H and 0.05 H respectively are connected in parallel across a 200 V, 50 Hz supply. Calculate: i. Conductance, susceptance and admittance of each coil. ii. Total current drawn by the circuit and its power factor. iii. Power absorbed by the circuit.		2

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SECTION-C	Attempt **ANY ONE** following Question	Marks **(1*10=10)**	CO
Q5(a)	What is the purpose of an equivalent circuit of a transformer? Obtain the approximate equivalent circuit of a transformer as referred to the primary with all necessary parameters.		3
Q5(b)	A 20kVA, 2000V/200V, single-phase, 50 Hz transformer has a primary resistance of 1.5 Ω and reactance of 2 Ω. The secondary resistance and reactance are 0.015 Ω and 0.02 Ω respectively. The no load current of transformer is 1A at 0.2 power factor. Determine: (i) Equivalent resistance, reactance and impedance referred to primary (ii) Supply current (iii) Total copper loss Draw approximate equivalent circuit.		3

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1*10=10)**	CO
Q6(a)	Derive an expression for torque in DC motor. A 230V DC series motor draws a 50A current. Armature and series field winding resistances are 0.2 Ω and 0.1 Ω, respectively. Calculate (i) brush voltage and (ii) back EMF.		4
Q6(b)	Why is an induction motor called a generalized transformer? Compare the induction motor with the transformer.		4

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1*10=10)**	CO
Q7(a)	How do you calculate energy consumption per kWh? Calculate the electricity bill amount for a leap year, if the following devices are used as specified. (A) 3 Bulbs of 40W for 6 hours per day (B) 4 Tube lights of 50W for 8 hours per day Given the rate of electricity is Rs. 7.50 per unit.		5
Q7(b)	Explain the construction, rating, specific applications of at least two types of wires and cables used in electrical installations.		5