Set-B

Roll No. : .....

MEERUT INSTITUTE OF ENGINEERING AND TECHNOLOGY

NH-58, Delhi-Roorkee Highway, Baghpat Road, Meerut – 250 005 U.P.

First Sessional Examination: Odd Semester 2022-23

290

8/12/22

Course/Branch	: B Tech /ALL/ SET-B/ OP4,OP6,OP8,OP10,OP12	Semester: I	
Subject Name	: Fundamental of Electrical Engineering	Max. Marks	: 60
Subject Code	: BEE101	Time	: 120 min

CO-1 : Applying Kirchhoff 's laws and network theorems in solving D.C Circuits.

CO-2 : Understand the steady state behavior of single phase and three phase A.C circuits.

Section – A (CO - 1) # Attempt both the questions # 30 Marks

Q.1 : Attempt any **SIX** questions (Short Answer Type). Each question is of two marks. (2 x 6 = 12 Marks)

a) Define Unilateral and Bilateral elements (BKL : K2 Level).

b) Define Linear and Non linear elements. (BKL : K2 Level).

c) Define ideal and practical voltage source with its V-I characteristics? (BKL : K2 Level).

d) Define Active and Passive elements. (BKL : K2 Level).

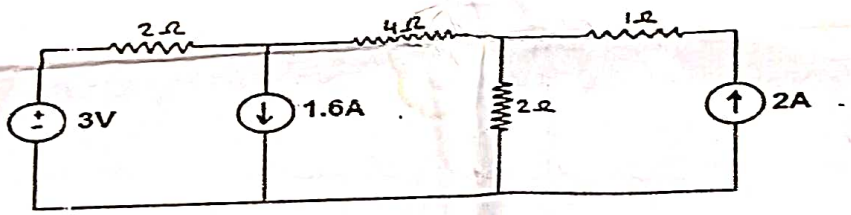
e) State KVL and KCL. (BKL : K2 Level).

f) Define ideal and practical Current source with its V-I characteristics. (BKL : K2 Level).

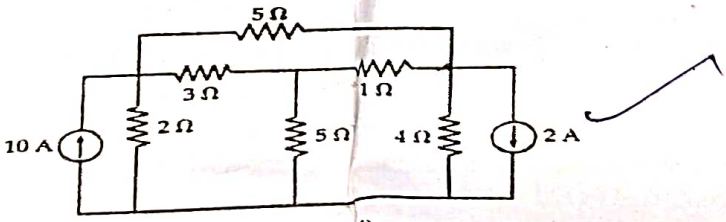
g) Write the application of KVL & KCL. (BKL : K1-K2 Level).

Q.2 : Attempt any **THREE** questions (Medium Answer Type). Each question is of 6 marks. (3 x 6 = 18 Marks)

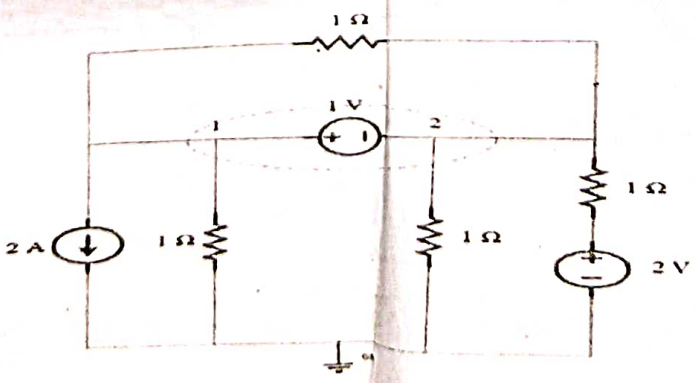
a) Find the current in 2Ω resistance by using mesh analysis. (BKL >= K3 Level).



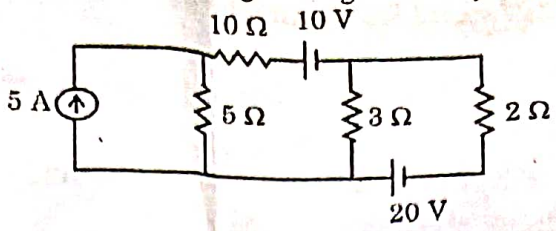
b) Using nodal analysis find the current in all branches. (BKL >= K3 Level).



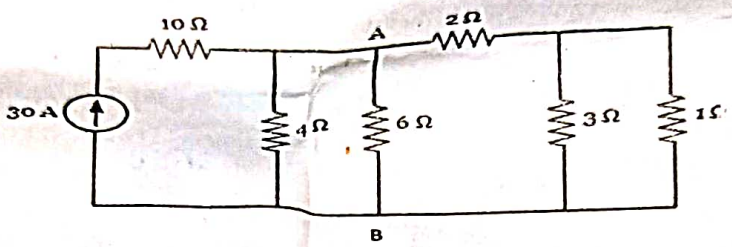
a) Find the current in 1Ω resistance. (BKL >= K3 Level).



d) Find the current in all branches shown in figure using mesh analysis. (BKL >= K3 Level).



e) Determine the current Through A-B by using Nodal analysis



Section – B (CO - 2) # Attempt both the questions # 30 Marks

Q.3 : Attempt any **SIX** questions (Short Answer Type). Each question is of two marks. (2 x 6 = 12 Marks)

a) Define Form factor & form factor in A.C circuit. (BKL : K1-K2 Level).

b) What are the advantages of three phase system over single phase system.. (BKL : K1-K2 Level).

c) What is power factor? (BKL : K1-K2 Level).

d) Find the relation between r.m.s and peak value of sinusoidal waveform.. (BKL : K1-K2 Level).

e) R=10 Ω, L= 0.05H and C = 10 μf are connected in parallel. Calculate Quality factor of the ckt.?(BKL : K1-K2 Level).

f) What is the accepter circuit ? (BKL : K1-K2 Level).

g) What is the relation between quality factor and band width?. (BKL : K1-K2 Level).

Q.4 : Attempt any **THREE** questions (Medium Answer Type). Each question is of 6 marks. (3 x 6 = 18 Marks)

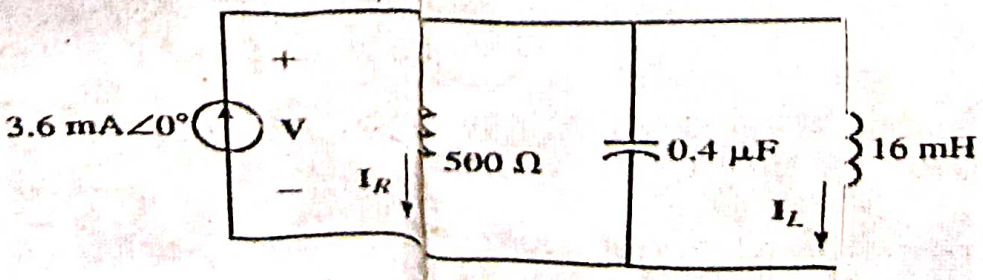
a) Derive the relation between line current & phase current in case of three phase delta connected balanced load. Three identical coils of resistance 8 Ω and inductive reactance 6 Ω are connected in star across 400V mains. Determine power, power factor and line current.. (BKL >= K3 Level).

b) Find the r.m.s, average, form factor and peak factor of the half wave rectifier output.((BKL >= K3 Level).

c) In a series circuit voltage and current equations are given as.(BKL >= K3 Level).
V = 283 Sin 314t and I = 4 Sin (314t - 45°) Find:
(i)Impedance (ii) Circuit parameters (iii) power factor and Active power.

d) When a inductive coil is connected to 20 V D.C supply, the current in coil is 4 A. Now the same coil is connected to 220 V,50 Hz A.C supply, the current in coil is 13 A. Calculate:
(i) Resistance of the coil (ii) Inductance of the coil.(iii) impedance of the coil. (BKL >= K3 Level).

e) Consider the circuit shown in figure below and calculate the following. (BKL >= K3 Level).



(i) Determine the resonant frequencies, ω(rad/s) and f(Hz) of the tank circuit.
(ii) Find the Q of the circuit at resonance.
(iii) Calculate the voltage across the circuit at resonance.

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Sessional Examination / Class Test –II : Even Semester 2022-23

610

14/6/23

Course/Branch : B Tech – EP1 TO OP14
Subject Name : Fundamental of Electrical Engineering
Subject Code : BEE201
Semester : Second
Max. Marks : 60
Time : 120 min

CO-3 : Identify the application areas of a single phase two winding transformer and calculate their efficiency.

CO-4 : Elaborate the working principle of AC and DC machines with their applications.

Section – A (CO - 3) # Attempt both the questions # 30 Marks

Q.1 : Attempt any SIX questions (Short Answer Type). Each question is of two marks. (2 x 6 = 12 Marks)

a) Find condition for maximum efficiency of transformer. (BKL : K1-K2 Level).
b) Load at which transformer provides negative voltage regulation? (BKL : K1-K2 Level).
c) Define the magnetic circuits. (BKL : K1-K2 Level).
d) Draw the phasor diagram of practical transformer on no load. (BKL : K1-K2 Level).
e) Define the reluctance in magnetic circuit. (BKL : K1-K2 Level).
f) Write the formula of hysteresis & eddy current loss in the transformer. (BKL : K1-K2 Level).
g) Why the transformer will not work with dc supply. Explain. (BKL : K1-K2 Level).

Q.2 : Attempt any THREE questions (Medium Answer Type). Each question is of 6 marks. (3 x 6 = 18 Marks)

a) Discuss the working of a single phase transformer. Derive EMF equation for a single phase transformer. (BKL >= K3 Level).
b) A 250 kVA single phase transformer has Iron loss of 1.8 kW. The full load copper loss is 2000 Watt. Calculate
   (i) Efficiency at full load, 0.8 lagging P.F.
   (ii) Efficiency at half load, 0.8 lagging P.F.
   (iii) kVA supplied at maximum efficiency
   (iv) % of load at which maximum efficiency occurs.
c) Draw the exact equivalent circuit of single phase transformer refer to secondary side. (BKL >= K3 Level).
d) What is voltage regulation of a transformer and also derive expression of voltage regulation at lagging power factor load. (BKL >= K3 Level).
e) A mild steel ring has a radius of 50 mm and a cross sectional area of 400 mm2. A current of 0.5 A flows in a coil wound uniformly around the ring and the flux produced is 0.1 mWb. If the relative permeability at this value of current is 200 find (a) the reluctance of the mild steel and (b) the number of turns on the coil. (BKL >= K3 Level).

Section – B (CO - 4) # Attempt both the questions # 30 Marks

Q.3 : Attempt any SIX questions (Short Answer Type). Each question is of two marks. (2 x 6 = 12 Marks)

a) What is back e.m.f and it's significance in dc motor? (BKL : K1-K2 Level).
b) What are the starting methods of synchronous motor? (BKL : K1-K2 Level).
c) Write the application of D.C series motor. (BKL : K1-K2 Level).
d) A 3-phase, 50 Hz, 4-poles induction motor has a full load speed of 1440 rpm. Calculate slip-speed. (BKL : K1-K2 Level).
e) What is the role of condenser in celling fan? (BKL : K1-K2 Level).
f) Define commutator of D.C machines? (BKL : K1-K2 Level).
g) How many types of Armature winding. (BKL : K1-K2 Level).

94.86%

NPQ3
60 A

Q.4 : Attempt any **THREE** questions (Medium Answer Type). Each question is of 6 marks. (3 x 6 = 18 Marks)

a) Derive the e.m.f. equation of dc generator. A 4 pole, lap wound dc generator has a useful flux of 70 mWb per pole. Calculate the generated e.m.f. when it is rotated at a speed of 900 r.p.m. with thehelp of prime mover. Armature consists of 220 number of turns. (BKL >= K3 Level).

b) Draw and explain slip-torque characteristics of 3-Φ induction motor and mention all regions ofoperations. (BKL >= K3 Level).

c) A 3-phase, 50 Hz induction motor has a full load speed of 960 rpm. Calculate:- i).slip ii).frequency of rotor induced e.m.f iii) no.of poles iv) speed of rotor field w.r.t rotor structure v) speed of rotor field w.r.to stator structure vi) speed of rotor field w.r.to stator field. (BKL >= K3 Level)

d) Derive the torque equation of D.C Motor. A 25 KW, 250 volt dc shunt generator has armature and field resistances of 0.06 Ω and 100 Ω respectively. Determine the total power developed when working as a generator delivering 25KW output. (BKL >= K3 Level).

e) Discuss why single phase induction motor is not self starting? What are its methods of starting?Explain any two types with phasor diagram. (BKL >= K3 Level).

NPQ

$Z = 2 \times 220 = 440$

$1800 = (n)^2 2000$ ∴