



Roll No:

B.TECH.

(SEM. II) THEORY EXAMINATION 2025-26
FUNDAMENTALS OF ELECTRICAL ENGINEERING

TIME: 3 HRS

M.MARKS: 70

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt all questions in brief.

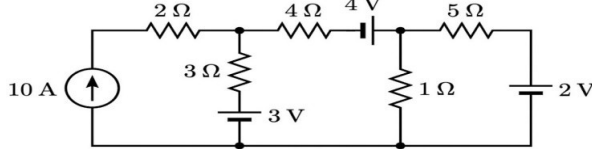
02 x 7 = 14

Q no.	Question	CO	Level
a.	Define active and passive circuit elements with one example each.	CO-1	K1
b.	What is power factor? State its significance.	CO-2	K1
c.	What happens to transformer core losses when frequency increases?	CO-3	K1
d.	Define slip in an induction motor.	CO-4	K1
e.	What is the purpose of earthing? List its advantages.	CO-5	K1
f.	State Kirchhoff's Voltage Law (KVL).	CO-1	K1
g.	Why is RMS value preferred over average value in AC analysis?	CO-2	K1

SECTION B

2. Attempt any three of the following:

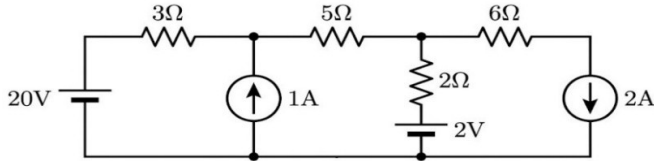
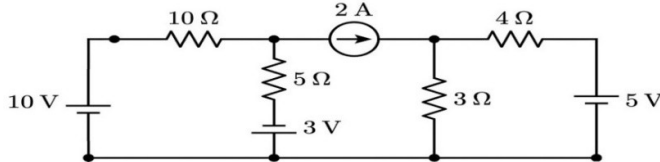
07 x 3 = 21

Q no.	Question	CO	Level
a.	What is meant by unilateral and bilateral elements? Find the current through $1\ \Omega$ resistance by using mesh analysis method. 	CO-1	K3
b.	Derive the expression of average power for series R-L circuit. A coil draws 5 A at 0.6 power factor lagging from a 230 V, 50 Hz supply. Determine impedance, resistance, and inductance.	CO-2	K3
c.	Explain the working principle of a transformer and derive the EMF equation. Also derive the condition for maximum efficiency.	CO-3	K3
d.	Describe the construction and working of a DC motor. A 6-pole wave wound DC generator has 604 conductors. Calculate the generated EMF when the flux per pole is 20mWb and the speed is 500rpm.	CO-4	K3
e.	Explain the working of MCB and ELCB with suitable applications.	CO-5	K3

SECTION C

3. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain the concept of node voltage method. Find the current through $1\ \Omega$ resistance by using nodal analysis method. 	CO-1	K3
b.	What is meant by linearity in electrical circuits? Calculate current through $5\ \Omega$ resistance by using KVL. 	CO-1	K3



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4. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Discuss the phenomenon of resonance in series RLC circuits. A series R-L-C circuits has $R=20\Omega$, $L=0.2H$ and $C=50\mu F$. Determine Resonance frequency, bandwidth and Quality factor at resonance.	CO-2	K3
b.	(i) Explain active, reactive, and apparent power. A circuit draws 10A at 230V with pf = 0.6 lagging. Calculate all three powers. (ii) Derive the relation between line current & phase current for a 3- phase delta connected system.	CO-2	K3

5. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	A 25 KVA loss less transformer has 500 turns on the primary and 40 turns on the secondary winding. The primary is connected to 3000V, 50 Hz mains determine: (i) primary and secondary current at full load (ii) Secondary EMF (iii) Maximum flux in the core.	CO-3	K3
b.	Derive the equivalent circuit of a practical transformer. Explain voltage regulation of a transformer with phasor diagram for lagging power factor.	CO-3	K3

6. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain slip-torque characteristics of a three-phase induction motor. Why is starting torque important?	CO-4	K3
b.	Why is a single-phase induction motor not self-starting? Compare synchronous motor and induction motor on the basis of speed, power factor, and applications.	CO-4	K3

7. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain the construction of cable with suitable diagram and write each layer. What is the use of insulation layer and metallic sheath?	CO-5	K3
b.	Write the short notes on the following: (i) Types of batteries (ii) MCCB (iii) Lighting Protection	CO-5	K3