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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

B.Tech. (First Semester) Examinations, December – 2024

23BBSES10001 – Basics of Electrical and Electronics Engineering

(Common to all branches)

Time: 3 hrs | Maximum: 60 Marks

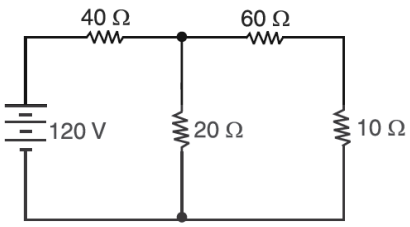
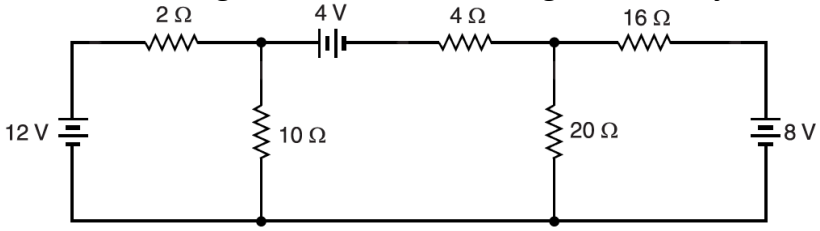
Answer all questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	A Resistance R is connected across a potential difference of 110 volts and dissipates energy at the rate of 220 watts. Calculate the value of resistance R.	CO1	K3
b.	Explain why is the core of a transformer laminated?.	CO3	K1
c.	Provide concise definition for knee voltage and static resistance.	CO4	K1
d.	Write the function of time base generator in a CRO.	CO5	K1
e.	Define resonance in series RLC circuit. Also find the expression for resonant frequency.	CO2	K1

PART – B **(10 x 5 = 50 Marks)**

		Marks	CO #	Blooms Level
	Answer ***ALL*** questions			
2. a.	State Thevenin's theorem. Using this theorem, find the current in the 20 Ω resistor as shown in figure. 	5	CO1	K3
b.	An alternating current of frequency 60 Hz has a maximum value of 120 A. Write down the equation for its instantaneous value. Reckoning time from the instant the current is zero and is becoming positive, find **(a)** the instantaneous value after 1/360 second and **(b)** the time taken to reach 96 A for the first time.	5	CO2	K3
	(OR)			
c.	Determine current through different resistors using Nodal Analysis. 	5	CO1	K3
d.	Derive an expression for average power in a series RL circuit and explain the different types of power using a power triangle.	5	CO2	K3
3.a.	Two coils A and B are connected in series across a 240-V, 50-Hz supply. The resistance of A is 5 Ω and the inductance of B is 0.015 H. If the input from the supply is 3 kW and 2 kVAR, find the inductance of A and the resistance of B. Calculate the voltage across each coil.	5	CO2	K2
b.	Describe the construction and operational principles of a DC generator in detail.	5	CO3	K2

(OR)

c.	An 8-pole generator has 500 armature conductors and has a useful flux per pole of 0.065 Wb. What will be the emf generated if it is lap connected and run at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave wound?	5	CO3	K3
d.	A resistance of 20Ω, an inductance of 0.2H and a capacitance of 100μF are connected in series across 220V, 50Hz mains. Determine the following (a) impedance (b) current (c) voltage across R, L and C (d) power in watts and VA (e) power factor and power factor angle.	5	CO2	K3
4.a.	With a neat circuit diagram and waveforms, explain the working of a center-tapped full-wave rectifier. Also, discuss its merits and demerits.	5	CO4	K2
b.	How does a Combinational clipper operate? Explain its working with the help of a circuit diagram.	5	CO4	K2

(OR)

c.	Difference between a semiconductor diode and a Zener diode. Explain Zener diode with its characteristics.	5	CO4	K2
d.	Explain the operation of positive clamper. Explain its working with the help of a circuit diagram.	5	CO4	K2
5.a.	Convert the following: (i) $(3A6.C58D)_{16} = (?)_8$ (ii) $(356.15)_8 = (?)_2 = (?)_{10}$ (iii) $(1AD.E0)_{16} = (?)_{10} = (?)_8$	5	CO5	K3
b.	Explain the operation of function generator. Elucidate its functionality using an appropriate block diagram.	5	CO5	K2

(OR)

c.	Describe the various components of a Cathode Ray Oscilloscope (CRO), supported by a relevant block diagram	5	CO5	K2
d.	Define universal gates. Explain with respective logic symbol and truth tables for a comprehensive understanding.	5	CO5	K2
6.a.	Derive the emf equation for a single-phase transformer. Also, explain the voltage transformation ratio of an ideal transformer.	5	CO5	K2
b.	A single-phase transformer develops 200V at the secondary terminals on no load condition. If the secondary winding has 1000 turns, Find the maximum flux in the core. Assume a 30V, 50 Hz single phase in the primary.	5	CO5	K2

(OR)

c.	Derive the emf equation a of a DC generator	5	CO4	K2
d.	A 6-pole d.c. shunt generator has 1500 armature conductors in six parallel paths. The average flux per pole in the air gap is 0.065 weber. Calculate the generated emf if the generator runs at a speed of 1500 RPM with the help of a prime mover.	5	CO4	K2

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