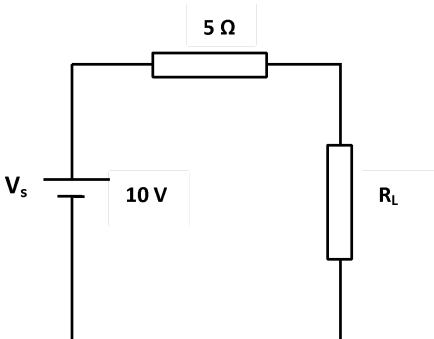USN
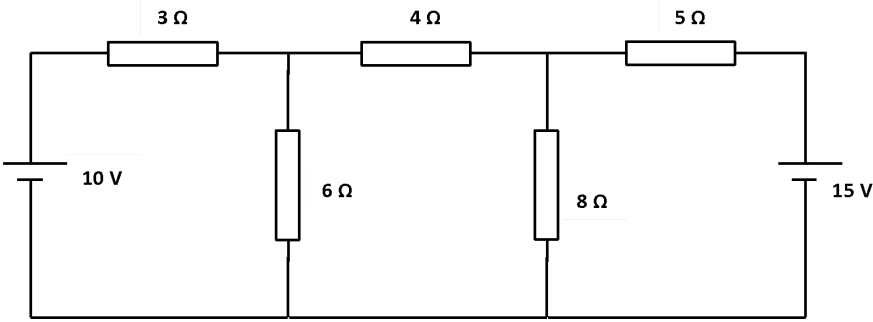
RV COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
I Semester B.E. April -2023 Examinations
ELECTRICAL AND ELECTRONICS ENGINEERING
BASICS OF ELECTRICAL ENGINEERING
(2022 SCHEME)

Time: 03 Hours   *Maximum Marks: 100*

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8, and 9 and 10.

		PART-A (Objective type for one or two marks) **(True & false and match the following questions are not permitted)**	
1	1.1	The maximum power drawn by the load R_L in the above circuit will be?	2
	1.2	A current of 20A flows through two ammeters A and B connected in series. Across A the potential difference is 0.2 V and across B it is 0.3 V. Find how the same will be divided between A and B when they are connected in parallel.	2
	1.3	A 50Hz sinusoidal current has peak factor 1.4 and form factor 1.1. Its average value is 20A. The instantaneous value of current is 15A at t=0. Write the equation of current.	2
	1.4	An AC Circuit has a Capacitance of 100 µF and negligible resistance. Calculate its reactance at 25 Hz.	2
	1.5	In a three-phase circuit, the phase current of 10A lags the voltage across the phase winding by 27 degrees. The impedance in each phase must be_____	2
	1.6	In a practical transformer, the iron loss remains practically constant from no-load to full load because _____	2
	1.7	A 3 phase, 4 pole induction motor works on 3 phase 50Hz supply. If the slip of the motor is 4%, then rotor speed will be _____rpm.	2
	1.8	List the types of single-phase induction motor.	2
	1.9	Mention the characteristics of fuse.	2
	1.10	What is Earthing? Mention the types of Earthing.	2
		PART-B (Maximum subdivisions is limited to 3 in each question)	
		UNIT-I	

2	a	Prove that Maximum Power Transferred to the load is $P_{max} = V_g^2/4R_L$.	8
	b	A network is arranged as shown in Fig. 1. Determine the current in each resistance. **Fig. 1**	8
		UNIT-II	
3	a	Derive an expression for Effective value and Average Value of an alternating quantity.	8
	b	An alternating current varying sinusoidally has an RMS value of 20A, 50Hz frequency. Write the i) instantaneous value equation ii) current 2.5ms and 12.5ms after passing through first positive maximum value. At what time will the instantaneous value be 14.14A measured from first positive maximum?	8
		OR	
4	a	Show that the power dissipated in a series RC circuit is $VIcos\varphi$. Draw the wave forms of voltage, current and power.	6
	b	When a voltage of 100 V at 50Hz is applied to coil A, the current taken is 8 A and the power is 120 W. When applied to coil B the current is 10 A and the power is 500 W. What will be current, and power taken if the two coils are connected in series across 100 V.	10
		UNIT-III	
5	a	A three-phase delta connected motor operating on a 400 V supply is delivering 25 HP at an efficiency of 0.87 and power factor of 0.42. Calculate the line current, phase current and the readings of two-watt meters connected to measure the input. Assume, 1hp=746 W.	8
	b	Give reasons: (i) Copper loss is called as variable loss and iron loss is called as Constant loss. (ii) The rating of transformer is in kVA. (iii)Transformer cannot be excited by DC supply.	8
		OR	
6	a	The primary and secondary winding of a 350kVA transformer have resistance of 0.75Ω and 0.005Ω respectively. The primary and secondary voltages are 10500 V and 500 V respectively. If the core loss is 3kW and the power factor on the load is 0.8, calculate the efficiency on (i) Full Load (ii) Half full load	6
	b	Prove that the line voltage in a star connected RYB phase sequence three phase system leads the phase voltage by 30^0. Obtain an expression for line voltage in terms of phase voltage.	10
		UNIT-IV	

7	a	List the difference between two types of three phase Induction motor. A 3 Φ, 6 pole 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Determine (i) Synchronous speed (ii) No load speed (iii) Full load speed (iv) Frequency of rotor at stand still and Frequency of rotor at full load.	8
	b	Explain the working principle of split phase single-phase induction motor with the help of neat sketch. How can you reverse the direction of rotation of such motor?	8
		OR	
8	a	Prove that a rotating magnetic field of constant magnitude is produced when the stator winding of a 3-phase induction motor is energized by a balanced 3 Φ supply. Write the advantages of 3 phase induction motor.	10
	b	What is Double revolving magnetic field? Describe the working principle of Single-phase induction motor. List the different types of Single phase Induction motor.	6
		UNIT-V	
9	a	Explain the concept of power transmission and distribution through block diagrams.	6
	b	Estimate the monthly electricity bill for the subsequent load fitted in an electrical installation. (i) 15 lamps 50 watts each working 4 hours/ day. (ii) 4 ceiling fans 100 watts each working 8 hours/day. (iii) 2 kw heater working 2 hours/day. (iv) Water pump of 0.5 HP runs for 2 hours per day Rate of charges for light and fans is 3.5 Rs / unit and heater and motor 4 Rs/unit.	10
		OR	
10	a	What is the necessity of earthing electrical apparatus and explain plate earthing with a neat diagram?	8
	b	Write brief notes on : (i) MCB (ii) Fuse (iii) Electric shock	8