Code No. : 11622 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD
Accredited by NAAC with A++ Grade
B.E. I-Semester Main & Backlog Examinations, Jan./Feb.-2024
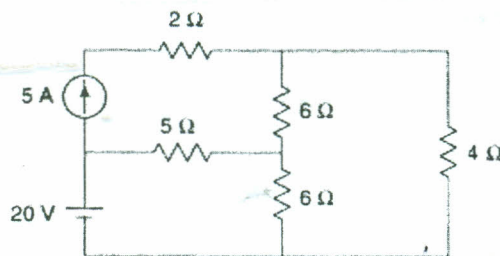### Basic Electrical Engineering
(I.T.)

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10× 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Define Kirchoff's laws	2	1	1	1
2.	Calculate the resistance of a copper tube with the external diameter of 10 cm, internal diameter of 9 cm, length of 2 m and resistivity of copper as $1.72 * 10^{-8}$ Ω-m.	2	2	1	1,2
3.	Why the sinusoidal waveform is superior over the other waveforms? Give reasons.	2	2	2	1
4.	A sinusoidal current wave is given by $i = 50\sin(100\pi t)$ Amps. Determine (i) The average value (ii) RMS value.	2	3	2	1,2
5.	What are the uses of commutator and carbon brushes in DC machine?	2	1	3	1
6.	Classify the different types of DC generators.	2	2	3	1
7.	Define statically self and mutual induced EMFs.	2	1	4	1
8.	A 5 kVA, 50 Hz, single-phase transformer has 500 primary turns, and 1,000 secondary turns. The net cross-sectional area of the core is 50 cm². When the primary winding is connected to 500V, calculate: (i) the flux produced in the core of transformer, ((ii) the secondary full-load current.	2	2	4	1,2
9.	Explain the working principle of Induction motor.	2	3	5	1
10.	Mention the practical applications of BLDC motor.	2	1	5	1
	Part-B (5×8 = 40 Marks)				
11. a)	Give the statement of Tellegen's theorem and explain it using a suitable example	3	2	1	1
b)	Find the current through the 4 Ω resistor using Superposition theorem.	5	3	1	1,2

			M	L	CO	PO
12.	a)	Analyze the behavior of series RL circuit excited with sinusoidal voltage.	3	3	2	1
	b)	In a circuit, if the measurements shows v= 250 sin500t and i= 25sin(500t- 30^0). Determine i) Circuit elements and ii) Active. Reactive and Apparent powers	5	4	2	1,2
13.	a)	Draw Speed-Torque Characteristics of DC shunt motor	3	2	3	1
	b)	The field and armature resistances of a 220V DC shunt machine are 88 Ω and 0.05 Ω, respectively. Calculate the total armature power developed when working (i) as a generator delivering power of 22 kW and (ii) as a motor taking 22 kW input.	5	4	3	1,2
14.	a)	Explain the need for power factor improvement	2	2	4	1
	b)	Draw the phasor diagram of single phase step up transformer for a lagging and leading power factor loads.	6	3	4	1
15.	a)	Explain the construction and working of a three phase induction motor.	3	2	5	1
	b)	A three phase, 440 V, 100 HP, 50Hz, 4-pole induction machine delivers rated output power at a slip of 0.05. Determine the: (i) Synchronous speed, (ii) motor speed, (iii) Speed of the rotating air gap field, (iv) Frequency of the rotor current, (v) Rated torque	5	4	5	1,2
16.	a)	Enumerate the differences between mesh analysis and nodal analysis.	3	1	1	1
	b)	Three equal impedances, each of (8 + j10) ohms, are connected in delta configuration. This is further connected to a 440 V, 50 Hz, three-phase supply. Find (i) phase voltage, (ii) load power factor, (iii) phase current, (iv) line current, and (v) active power	5	4	2	1,2
17.		Answer any *two* of the following:				
	a)	Briefly explain the speed control techniques of DC shunt motor.	4	3	3	1
	b)	List out the features of a transformer.	4	4	4	1
	c)	Explain the construction and working of variable reluctance stepper motor.	4	4	5	1

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	31%
iii)	Blooms Taxonomy Level – 3 & 4	49%

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