Hall Ticket Number:

Code No. : 12225 N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A-+ Grade
B.E. II-Semester Main & Backlog Examinations, August-2023
Basic Electrical Engineering
(Common to N : CSE, AIML & ECE O : Civil, Mech. & IT)

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.	Compute R_{eq} for the circuit shown below?	2	3	1	1,2,3,12
2.	Define KCL and KVL?	2	1	1	1,2,3,12
3.	Explain the significance of RMS value of a sinusoidal waveform?	2	2	2	1,2,3,12
4.	Draw the phasor diagram of series R-L-C circuit, when Capacitive reactance(X_C) is greater than inductive reactance(X_L)?	2	2	2	1,2,3,12
5.	With neat sketch, describe different types of DC generators based on excitation?	2	1	3	1,2,3,12
6.	A DC motor takes an armature current of 110A at 480 V. The armature circuit resistance is 0.2Ω. The machine has 6-poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate the gross torque developed by the armature?	2	3	3	1,2,3,12
7.	Illustrate the comparison of Fuse and MCB?	2	1	4	1,2,3,12
8.	Evaluate the electrical energy consumed in kWh when operating ten 50W bulbs for 10hours in a day for one month (30days)?	2	1	4	1,2,3,12
9.	List out any four applications of stepper motor?	2	2	5	1,2,3,12
10.	Draw the torque-slip characteristics of a three-phase induction motor? Identify the region of stable operation and justify the same?	2	2	5	1,2,3,12

Part-B (5×8 = 40 Marks)

11. a)	Calculate V_0 of the circuit shown below using Nodal analysis?	4	3	1	1,2,3,12

b)	State the maximum power transfer theorem. Derive the condition for the maximum power transfer to the load in a circuit?	4	2	1	1,2,3,12

12. a)	Evaluate the following for the sinusoidal waveform?	4	2	2	1,2,3,12

    i)   RMS value
    ii) Average value
    iii) Form factor
    iv) Peak factor

b)	For the circuit shown below, determine the following?	4	3	2	1,2,3,12

    i)   Impedance
    ii) Power factor
    iii) Instantaneous value of current in the circuit
    iv) Active power supplied by the source

13. a)	Derive the emf equation in DC generator?	4	2	3	1,2,3,12
b)	A 230V DC shunt motor has an armature resistance of 0.5 Ω and field resistance of 115Ω. At no load, the speed is 1200r.p.m. and the armature current 2.5A. On application of rated load, the speed drops to 1120r.p.m. Determine the following, when the motor delivers rated load?	4	3	3	1,2,3,12

    i)   Field current
    ii) Armature current
    iii) Line current and
    iv) Power input to the motor

		M	L	CO	PO
14. a)	Explain the working principle of a transformer? Draw the phasor diagram of a practical transformer with lagging power factor load?	4	2	4	1,2,3,12
b)	A 20 kVA, 2000V/200 V, single phase, 50 Hz transformer has a primary resistance of 2.5Ω and reactance of 4.8Ω. The secondary resistance and reactance are 0.01Ω and 0.018Ω respectively. The no-load current drawn by the transformer is 0.3A at a power factor of 0.25 lagging, when high-voltage(HV) side is primary, evaluate the following? i) Equivalent resistance and reactance referred to primary ii) Equivalent resistance and reactance referred to secondary iii) Magnetizing current drawn by the transformer iv) Iron losses of the transformer	4	3	4	1,2,3,12
15. a)	Explain about rotating magnetic field theory in a 3-phase induction motor?	4	2	5	1,2,3,12
b)	Explain the working of Brushless DC (BLDC) motor with a neat sketch?	4	1	5	1,2,3,12
16. a)	For the figure shown below, evaluate I_1 using Superposition theorem?	4	3	1	1,2,3,12

		M	L	CO	PO
b)	Three similar coils each having a resistance of 5Ω and an inductance of 0.02H are connected in star to a 440V, 3-phase, 50Hz supply. Calculate the phase current, line current, phase voltage and line voltage of the system?	4	3	2	1,2,3,12
17.	Answer any *two* of the following:				
a)	Illustrate various speed control techniques in DC Shunt motor?	4	2	3	1,2,3,12
b)	Define power factor? Explain static capacitor method of power factor improvement in a series R-L load circuit with phasor diagram?	4	3	4	1,2,3,12
c)	Explain the construction and working of variable reluctance Stepper motor?	4	1	5	1,2,3,12

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

*****